EPA/ROD/R05-95/287
1995

EPA Superfund
Record of Decision:

FEED MATERIALS PRODUCTION CENTER (USDOE)
EPA ID: OH6890008976
OU 04
FERNALD, OH
12/07/1994

FINAL
RECORD OF DECISION
FOR REMEDIAL ACTIONS AT
OPERABLE UNIT 4

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

<IMG SRC 0595287>

DECEMBER 1994

U.S. DEPARTMENT OF ENERGY
FERNALD FIELD OFFICE

DECLARATION STATEMENT

SITE NAME AND LOCATION

Fernald Environmental Management Project (FEMP) Site - Operable Unit 4, Fernald, Hamilton County, Ohio

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for Operable Unit 4 of the Fernald Site in Fernald, Ohio. This remedial action was selected in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable 40 Code of Federal Regulations (CFR) Part 300, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

For Operable Unit 4 at the FEMP, DOE has chosen to complete an integrated CERCLA/NEPA process. This decision was based on the longstanding interest on the part of local stakeholders to prepare an Environmental Impact Statement (EIS) on the restoration activities at the FEMP and on the recognition that the draft document was issued and public comments received. Therefore, this single document is intended to serve as DOE's Record of Decision (ROD) for Operable Unit 4 under both CERCLA and NEPA; however, it is not the intent of the DOE to make a statement on the legal applicability of NEPA to CERCLA actions.

The decision presented herein is based on the information available in the administrative record for Operable Unit 4 and maintained in accordance with CERCLA. The major documents prepared through the CERCLA process include the Remedial Investigation (RI), the Feasibility Study (FS), and the Proposed Plan (PP) for Operable Unit 4. The FS and the PP also comprised DOE's draft EIS and were made available for public review and comment. This decision is also based on the public hearing held on March 21, 1994, in Harrison, Ohio, and the public meeting held on May 11, 1994, in Las Vegas, Nevada following the issuance of the Feasibility Study/Proposed Plan-Draft Environmental Impact Statement (FS/PP-DEIS). DOE has considered all comments received during the public comment period on the FS/PP-DEIS and following issuance of the final EIS in the preparation of this ROD.

The State of Ohio concurs with the remedy and the applicable or relevant and appropriate requirements (ARARs) put forth in this ROD for Operable Unit 4.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from Operable Unit 4, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE REMEDY

This is the selected remedial action for Operable Unit 4, one of five operable units at the FEMP. The materials within Operable Unit 4 exhibit a wide range of properties. Most notable would be the elevated direct radiation associated with the K-65 residues versus the much lower direct radiation associated with cold metal oxides in Silo 3. Even more significant would be the much lower levels of contamination associated with the soils and building materials, like concrete, within the Operable Unit 4 Study Area. To account for these differences and for the varied cleanup alternatives applying to each waste type, Operable Unit 4 was segmented into three subunits. These subunits are described as follows:

Subunit A: Silos 1 and 2 contents (K-65 residues and bentonite clay) and the sludge in the decant sump tank

Subunit B: Silo 3 contents (cold metal oxides)

Subunit C: Silos 1, 2, 3, and 4 structures, contaminated soils within the Operable Unit 4 boundary, including surface and subsurface soils and the earthen berm around Silos 1 and 2; the decant sump tank; the radon treatment system; the concrete pipe trench and the miscellaneous concrete structures within Operable Unit 4, any debris (i.e., concrete, piping, etc.) generated through implementing cleanup for Subunits A and B, and any perched groundwater encountered during remedial activities.

On the basis of the evaluation of final alternatives, the selected remedy addressing Operable Unit 4 at the FEMP is a combination of Alternatives 3A.1/Vit - Removal, Vitrification, and Off-site Disposal - Nevada Test Site (NTS); 3B.1/Vit - Removal, Vitrification, and Off-site Disposal - NTS; and 2C - Demolition, Removal and On-Property Disposal. These alternatives apply to Subunits A, B, and C respectively. The major components of the selected remedy include:

- Removal of the contents of Silos 1, 2, and 3 (K-65 residues and cold metal oxides) and the decant sump tank sludge.
- Vitrification (glassification) to stabilize the residues and sludges removed from the silos and decant sump tank.
- Off-site shipment for disposal at the NTS of the vitrified contents of Silos 1, 2, 3, and the decant sump tank.
- Demolition of Silos 1, 2, 3, and 4 and decontamination, to the extent practicable, of the concrete rubble, piping, and other generated construction debris.
- Removal of the earthen berms and excavation of contaminated soils within the boundary of Operable Unit 4, to achieve remediation levels. Placement of clean backfill to original grade following excavation.
- Demolition of the vitrification treatment unit and associated facilities after use. Decontamination or recycling of debris prior to disposition.
- On-property interim storage of excavated contaminated soils and contaminated debris in a manner consistent with the approved Work Plan for Removal Action 17 (improved storage of soil and debris) pending final disposition in accordance with the Records of Decision for Operable Units 5 and 3, respectively.
- Continued access controls and maintenance and monitoring of the stored wastes inventories.
- Institutional controls of the Operable Unit 4 area such as deed and land use restrictions
- Potential additional treatment of stored Operable Unit 4 soil and debris using Operable Unit 3 and 5 waste treatment systems.

- Pumping and treatment as required of any contaminated perched groundwater encountered during remedial activities.

- Disposal of Operable Unit 4 contaminated debris and soils consistent with the Records of Decision for Operable Units 3 and 5, respectively.

The remedy specifies off-site disposal of vitrified contents of Silos 1, 2 and 3 at the NTS. At the time of the signing of this ROD, The Department of Energy - Nevada Operations Office (DOE-NV) is in the process of preparing a site-wide environmental impact statement (EIS) under NEPA for the NTS. Shipments of Operable Unit 4 vitrified waste are not proposed to begin until after the planned completion of the EIS for the NTS.

The planned date of completion of the EIS for the NTS is December 1995, at which time a Record of Decision is expected to be issued. Shipments of low-level waste generated from the remediation of Operable Unit 4 are not proposed to begin until mid-1997, which should be after the planned completion of the NTS site-wide EIS. Given these timeframes, DOE does not anticipate the NTS EIS schedule will negatively impact the Operable Unit 4 remediation schedule discussed in the ROD.

The containerized vitrified product will require interim storage at the FEMP prior to its transportation to the NTS for disposal. The purpose of this interim storage is two-fold; first, the vitrified product will require verification sampling in order to certify that each production lot has met specific performance and waste disposal criteria; and second, to provide the Fernald waste shipping program a buffer staging area where the material can be safely managed prior to its shipment to NTS in accordance with DOE as low as reasonably achievable (ALARA) principles, ARARs identified and included in the Operable Unit 4 ROD, as well as in a manner protective of human health and the environment. It has been anticipated that the interim storage area will be needed to accommodate the interim handling of approximately 90 days of vitrification production.

The decision regarding the final disposition of the remaining Operable Unit 4 contaminated soil and debris will be placed in abeyance, until completion of the Records of Decision for Operable Units 3 and 5 remedial actions, in order to take full advantage of planned and in progress waste minimization treatment processes by these operable units. Further, this strategy enables the integration of disposal decisions for contaminated soils and debris on a site-wide basis.

In the unlikely event unforeseen circumstances preclude the integration of Operable Unit 4 soil and debris into the Operable Unit 3 and/or Operable Unit 5 treatment and disposal decisions, the disposal decision for Operable Unit 4 contaminated soils and debris will be documented in a ROD amendment for Operable Unit 4 in accordance with Section 117(c) of CERCLA and United States Environmental Protection Agency (EPA) guidance. The ROD amendment will provide the public and the EPA further opportunity to review and comment on the final disposal option for Operable Unit 4 soils and debris. A ROD amendment to the Operable Unit 4 ROD will not be necessary in the event the Operable Unit 3 remedy for debris and the Operable Unit 5 remedy for contaminated soils can be feasibly implemented for Operable Unit 4.

In reaching the decision to implement this remedial alternative, DOE evaluated other alternatives for each subunit, in addition to no action. The other alternatives are: (a) Subunit A - Silos 1 and 2 Contents: (1) Removal, Cement Stabilization, Off-Site Disposal at Nevada Test Site; (b) Subunit B - Silo 3 Contents: (1) Removal, Vitrification, On-Property Disposal; (2) Removal, Cement Stabilization, On-Property Disposal; (3) Removal, Cement Stabilization, Off-Site Disposal at Nevada Test Site; (c) Subunit C - Silos 1, 2, 3, and 4 Structurcs. Soils, and Debris: (1) Demolition, Removal, Off-Site Disposal at Nevada Test Site; (2) Demolition, Removal, Off-Site Disposal at Permitted Commercial Facility.

A description of the alternatives is provided in the Decision Summary of the ROD, hereby incorporated by reference for DOE's NEPA ROD, and is available in the Administrative Record. CERCLA's nine criteria set forth in 40 CFR Part 300, the National Oil and Hazardous Substances Pollution Contingency Plan were used to evaluate the alternatives. The selected remedy represents the best balance among the alternatives with respect to these criteria and is the environmentally preferable alternative.

The preferred alternative for Operable Unit 4 provides the best performance when compared with the other alternatives, with respect to the evaluation criteria. This remedy will achieve substantial risk reduction by removing the sources of contamination, treating the material which poses the highest risk, shipping the treated residues off-site for disposal, managing the remaining contaminated soils and debris consistent with the site-wide strategy. The selected treatment alternative both reduces the mobility of the hazardous constituents and results in significant reduction in the volume of materials requiring disposal. The selected remedy also provides the highest degree of long-term protectiveness for human health and the environment.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost effective. This remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable, and satisfies the statutory preference for remedies that employ treatment, and also reduce toxicity, mobility, or volume as a principal element. This remedy will result in contaminated debris and soil being dispositioned bv Operable Units 3 and 5, respectively. Because this remedy will result in hazardous substances (i.e., contaminated soil and debris) remaining on site, above health-based levels, a review will be conducted every five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

All practical means to avoid or minimize environmental harm from implementation of the selected remedy have been adopted. During excavation activities. sediment controls will be implemented to eliminate potential surface water runoff and sediment deposition to Paddys Run. Final site layout and design will include all practicable means (e.g., sound engineering practices and proper construction practices) to minimize environmental impacts.

Regional Administrator, Date
U.S. Environmental Protection Agency Region V

Assistant Secretary for Environmental Management Date
U.S. Department of Energy

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ACRONYM LIST

AEA	Atomic Energy Act
AEC	Atomic Energy Commission
ARAR	applicable or relevant and appropriate requirements
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CIS	Characterization Investigation Study
CFR	Code of Federal Regulations
CMSA	Consolidated Metropolitan Statistical Area

COC	Constituents of Concern
COE	United States Army Corps of Engineers
CT	central tendency
DOE	United States Department of Energy
DOE-FN	United States Department of Energy - Fernald Field Office
DOE-NV	United States Department of Energy - Nevada Operations Office
DOT	U.S. Department of Transportation
EIS	Environmental Impact Statement
EP	Extraction Procedure
EPA	United States Environmental Protection Agency
FEMP	Fernald Environmental Management Project
FERMCO	Fernald Environmental Restoration Management Corporation
FFCA	Federal Facility Compliance Agreement
FMPC	Feed Materials Production Center
FRESH	Fernald Residents for Enviromnent, Safety, and Health
FS	Feasibility Study
FS/PP-DEIS	Feasibility Study/Proposed Plan - Draft Environmental Impact Statement
FSIPP-FEIS	Feasibility Study/Proposed Plan - Final Environmemtal Impact Statement
HEAST	Health Effects Assessment Summary Table
HEPA	High-Efficiency Particulate Air (filter)
HI	Hazard Index
HQ	Hazard Quotient
IARC	International Agency for Research on Cancer
ILCR	incremental lifetime cancer risk
IRIS	Integrated Risk Information System
ISA	Initial Screening of Alternatives
LRA	leading remedial alternative
MCL	maximum containment level

MCLG	maximum containment level goal
MCW	Mallinckrodt Chemical Works
MSL	mean sea level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act
NOEL	No Observed Effect Level
NOI	Notice of Intent
NOV	Notice of Violation
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRHP	National Register of Historic Places
NTS	Nevada Test Site
O&M	operation and maintenance
OAC	Ohio Administrative Code
OEPA	Ohio Environmental Protection Agency
ORC	Office of Regional Council
PAH	polyaromatic hydrocarbons
Pb	lead
PCB	polychlorinated biphenyls
PEIC	Public Enviromnental Information Center
Po	polonium
PP	Proposed Plan
PRG	proposed remediation goals
PRL	proposed remediation level
Ra	radium
RCRA	Resource Conservation and Recovery Act
RfD	reference dose
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study

RME	reasonable maximum exposure
Rn	radon
ROD	Record of Decision
RTS	radon treatment system
SARA	Superfund Amendment and Reauthorization Act
SDWA	Safe Drinking Water Act
TBC	to be considered
TCLP	Toxicity Characteristic Leaching Procedure
Th	thorium
U	uranium
USDA	United States Department of Agriculture
VOC	volatile organic compounds

LIST OF WEIGHTS AND MEASURES

cm	centimeter
ft	feet
ha	hectare
in	inch
kg	kilogram
km	kilometer
km^2	square kilometers
L	liters
m	meter
m3	cubic meters
µg/l	micrograms per liter
M	million
mi	miles
mi^2	square miles
mg	milligram
mg/kg	milligrams per kilogram

mg/kg-day milligrams per kilogram day

mg/l milligrams per liter

pCi/l picoCuries per liter

pCi/g picoCuries per gram

ppb parts per billion

yd3 cubic yards

1.0 SITE LOCATION AND DESCRIPTION

1.1 LOCATION

The Fernald Environmental Management Project (FEMP) site is a 425 hectare (ha) (1050 acres), government-owned facility located in southwestern Ohio, approximately 29 kilometers (km) (18 miles) northwest of downtown Cincinnati. The facility is located just north of Fernald, Ohio, a small farming community, and lies on the boundary between Hamilton and Butler counties (Figure 1-1).

In accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the FEMP was placed on the National Priorities List (NPL) in November 1989 as a result of environmental impacts caused by facility operations.

From 1952 until 1989, the FEMP site provided high-purity uranium metal products to support United States defense programs. Uranium production was halted in 1989 due to declining demand and a recognized need to commit available resources to environmental remediation. Former uranium operations at the FEMP site were limited to a fenced 55 ha (136 acres) tract of land known as the former Production Area located near the center of the site. The former Production Area consists of plant buildings, scrap metals, equipment, and drummed inventories all of which are components of Operable Unit 3. Large quantities of liquid and solid wastes were generated by the various production operations at the FEMP site. Prior to 1984, solid and slurried wastes received from off site sources and generated from FEMP processes were stored or disposed in the Waste Storage Area. This area, located west of the production facilities, includes: six low-level radioactive waste storage pits, two earthen-bermed concrete silos containing K-65 residues, one concrete silo containing metal oxides, one unused concrete silo, two lime sludge ponds, a burn pit, a clearwell, and a solid waste landfill. The Waste Storage Area, shown graphically in Figure 1-2, is addressed under FEMP Operable Units 1, 2, and 4. The former Production Area and Waste Storage Area are fenced and closed to the general public. Operable Unit 5 consists of all environmental media not associated with the preceding operable units. The remaining FEMP site areas consist of forest and pasture lands, a portion on which a nearby dairy farmer is authorized to graze livestock.

A sixth operable unit, known as the Comprehensive Site-Wide Operable Unit, was added as a provision of the Amended Consent Agreement (signed in 1991). This is not a specific site area; rather, it was created to enable DOE, the EPA, and the public to make a final assessment from a site wide perspective that ongoing planned remedial actions identified in the Records of Decision for the five operable units will provide a comprehensive remedy which is protective of human health and the environment.

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This remedial action addresses Operable Unit 4 at the FEMP. Operable Unit 4 (Figure 1-3) is a 2.3 ha (5.8 acres) area located on the western side of the facility and is comprised of the following facilities and associated environmental media:

- Silos 1 and 2 and their contents (also termed K-65 silos);

! Silo 3 and its contents (termed cold metal oxide silo);

! Silo 4 (empty);

! The decant sump (an underground tank and its contents);

! A radon treatment system;

! A portion of a concrete pipe trench and other concrete structures;

! An earthen berm surrounding Silos 1 and 2;

! Soils beneath and immediately surrounding Silos 1, 2, 3, and 4;

! Perched groundwater in the vicinity of the silos that are encountered during the implementation of remedial actions;

Silos 1 and 2, the K-65 silos, contain 6,120 cubic meters (m3) [8,005 cubic yards (yd3)] of K-65 residues generated from the processing of high-grade uranium ore. The silos are large, cylindrical, above-grade, concrete vessels with post-tensioned steel reinforcing. Each of the domed silos is 24.4 meter (m) [80 feet (ft)] in diameter and 11 m (36 ft) high to the center of the dome.

The K-65 residues contain large activity concentrations of radionuclides, including radium and thorium. These radionuclides contribute to an elevated direct penetrating radiation field in the vicinity of the silos and to the chronic emission of significant quantities of the radioactive gas, radon, to the atmosphere from the silos. The K-65 residues are classified as by-product materials, consistent with Section 11(e)2 of the Atomic Energy Act (AEA), generated consequential to the processing of natural uranium ores.

Silo 3 contains 3,890 m3 (5,088 yd3) of residues, known as cold metal oxides, which were generated at the FEMP site during uranium extraction operations in the 1950s involving the previously mentioned uranium ores and ore concentrates received from a variety of uranium mills in the United States and abroad. Silos 3 and 4 are identical in design and construction to Silos 1 and 2. The residues within Silo 3 are similarly classified as by-product materials pursuant to Section 11(e)2 of the AEA. Silo 4 was never used for waste storage; however, rainwater has infiltrated the silo and has been removed in 1989 and again in 1991.

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1.2 DEMOGRAPHICS AND LAND USE

The FEMP is located in the Cincinnati Consolidated Metropolitan Statistical Area (CMSA) which encompasses a regional area comprised of eight counties in Ohio, Kentucky, and Indiana. Population within the eight-county metropolitan area exceeded 1.7 million in 1990, and within a 5-mile radius of the FEMP site, there were an estimated 22,927 residents in 1990.

The on-property work population includes employees of DOE, it's site restoration management contractor, the Fernald Environmental Restoration Management Corporation (FERMCO), and other subcontractors. Physical structures are located on approximately 82 ha (203 acres) in the center of the FEMP site, in the administration area and in the former Production Area. The FEMP maintains strict access controls, including a security force and fences, which control public access to the site.

The land adjacent to the FEMP is primarily devoted to open land use such as agriculture and recreation. Scattered residences and several villages, including Fernald, New Baltimore, Ross, New Haven, and Shandon are located near the FEMP site. The nearest residence is within three quarters of a mile from the center of the facility. The nearest residences to the western FEMP property boundary (the boundary along the eastern side of Paddys Run Road) are located along the western side of Paddys Run Road. A dairy farm is located on Willey Road just outside the southeast corner of the FEMP property boundary. Several residences are located off

Paddys Run Road approximately 2.4 km (1.5 mi) south of the FEMP property. These residences are in the vicinity of the South Plume, a portion of the Great Miami Aquifer that contains a plume of uranium contamination originating from the FEMP extending south of the property boundary for approximately three-quarters of a mile.

More than 160 ha (395 acres) of the open land on the FEMP property are leased to a nearby dairy farmer who grazes livestock on the property. Pine plantations are located to the northeast and southwest of the former Production Area. A considerable amount of the soils within the boundaries of the FEMP site are designated by the United States Department of Agriculture (USDA) as prime agricultural soil (USDA 1980, 1982). However, none of the land on the FEMP site is designated prime farmland under the Farm and Policy Protection Act regulations (7 CFR §658) of 1981. Because the area had been intensively used for agricultural purposes prior to the establishment of the FEMP facility, there is no land on or in the vicinity of the FEMP site where a pre-developed natural environment remains intact. The land closest to this description would be recreated prairie lands on the Miami Whitewater Forest Park, several miles south of the FEMP site.

The area surrounding the FEMP site has a large and diverse archaeological and historical resource base. According to records kept by the Miami Purchase Association for Historic Preservation, an unusually high percentage of the existing 19th century buildings in the area are historically important. Within the vicinity of the FEMP site [a 3.2 km (2 mi) radius from the boundary], there are properties listed on the National Register of Historic Places (NRHP) and a number of additional structures that have been judged eligible for inclusion in the listing. Six major archaeological sites lie within five miles of the FEMP site and five of these are included in the NRMP. No archaeological sites or properties on the NRHP are located in or adjacent to Operable Unit 4.

1.3 TOPOGRAPHY AND SURFACE WATER HYDROLOGY

The maximum elevation along the northern boundary of the FEMP property is a little more than 213 m (700 ft) above mean sea level (MSL). The former Production Area and Waste Storage Area rest on a relatively level plain at about 174 m (580 ft) above MSL. The plain slopes from 183 m (600 ft) above MSL along the eastern boundary of the FEMP to 174 m (570 ft) above MSL at the K-65 silos, and then drops off toward Paddys Run stream at an elevation of 168 m (550 ft) above MSL.

All drainage, including surface water on the FEMP site is generally from east to west towards Paddys Run, with the exception of the extreme northeast corner which drains east toward the Great Miami River. Major surface water bodies on and adjacent to the FEMP site include the Storm Sewer Outfall Ditch, Paddys Run, end the Great Miami River (see Figure 1-4). The Storm Sewer Outfall Ditch originates within the FEMP site and flows toward the southwest where it enters Paddys Run, which flows southward along the western boundary of the facility. Paddys Run is a tributary of the Great Miami River. The Great Miami River flows generally toward the southwest; however, locally it flows to the east and south of the FEMP site.

Paddys Run originates north of the FEMP site, flows southward along the western boundary of the facility, and enters the Great Miami River approximately 2.4 km (1.4 mi) south of the southwest corner of the FEMP property. The stream is approximately 14 km (8.8 mi) long and drains an area of approximately 40.9 square kilometers (km^2) [15.8 square miles (mi^2)]. Due to the highly permeable channel bottom, the stream loses water to the underlying Great Miami Aquifer in some locations. In addition, the stream is ephemeral and is generally dry during the summer months.

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The Great Miami River is the main surface water feature in the vicinity of the FEMP site, which receives effluent water from a National Pollutant Discharge Elimination System (NPDES) permitted discharge from the FEMP site. The river flows generally to the southwest and has a drainage area of approximately 8702 km^2 (3360 mi^2) at the Hamilton gauge, which is located about 16.1 km (10 mi) upstream from the FEMP site NPDES discharge outfall.

The river exhibits meandering patterns that result in sharp directional changes over distances of less than 900 m (2,953 ft). Directly east of the FEMP site and within the site-wide Remedial Investigation/Feasibility

Study (RI/FS) Area, the river passes through a 180-degree curve known as the Big Bend. A 90-degree bend in the river also occurs near New Baltimore, approximately 3.2 km (2 mi) downstream from the FEMP site discharge outfall.

Surface water flow within Operable Unit 4 is directed through a series of trench drains, concrete curbs, and gutters to an inground concrete sump located in waste storage area. Water from these storm water control facilities are directed through existing site treatment systems prior to discharge through the FEMP effluent line to the Great Miami River.

1.4 GEOLOGY AND HYDROGEOLOGY

The FEMP overlies a 3.2 to 4.8 km (2 to 3 mi) wide buried Pleistocene valley known as the New Haven Trough. This valley was formed (eroded) by the ancestral Ohio River during the Pleistocene period and was subsequently filled with glacial outwash materials that were in turn covered by glacial overburden as glaciers advanced across the area. The outwash deposits under the FEMP are a part of the Great Miami Aquifer, which is a widely distributed buried valley aquifer. In addition to surface water, the valley fill aquifer system is the major source of drinking water in the southwestern Ohio area.

Since the last retreat of continental glaciers, the streams in the area have removed much of the glacial overburden and lacustrine strata left by the ice sheets. The Great Miami River has eroded through the glacial overburden and is now in direct contact with the outwash deposits that comprise the Great Miami Aquifer. Paddys Run is also in contact with these deposits in its lower reaches.

The Great Miami Aquifer is the principal aquifer within the FEMP Study Area and has been designated a sole-source aquifer under the provisions of the Safe Drinking Water Act (SDWA). The buried valley in which it occurs varies in width from about 0.8 km (0.5 mi) to more than 3.2 km (2 mi), having a U-shaped cross section with a broad, relatively flat bottom and steep valley walls. This valley is filled with extensive deposits of sand and gravel that range in thickness from 36 to 60 m (120 to 200 ft) in the valley to only several feet along the valley walls, along with scattered silt and clay deposits.

Contained within the sand and gravel that underlies much of the FEMP property is a relatively continuous, low-permeability clay interbed ranging from about 1.5 to 4.5 m (5 to 15 ft) in thickness. The clay interbed which exists below the Operable Unit 4, occurs at an approximate elevation of 140 m (460 ft) above MSL. This clay interbed divides the aquifer into upper and lower sand and gravel units, referred to as the Upper Great Miami Aquifer and the Lower Great Miami Aquifer.

Overlying the Great Miami Aquifer throughout most of the FEMP property, including Operable Unit 4, are a series of glacial overburden deposits. The glacial overburden is composed primarily of till, a dense, silty clay that contains discontinuous and isolated lenses of poorly sorted fine- to medium-grained sand and gravel, silty sand, and silt. The glacial overburden exposed at the surface has relatively low permeability, so most of the precipitation that falls on it is lost to evaporation and surface water runoff. Within Operable Unit 4, sand and gravel outwash deposits of the buried valley are overlain by 1.5 to 3 m (5 to 10 ft) of till that is in turn overlain by 4.5 to 6 m (15 to 20 ft) of lacustrine sediments. The till is an unsorted mixture of clay, silt, sand, and pebble to cobble size material with 70 to 80 percent of the material filling in the clay and silt size range.

Erratically distributed pockets of silty sand and gravel within the glacial overburden contain zones of perched groundwater. Perched groundwater is separated from the underlying aquifer by the surrounding relatively impermeable clay and silt components of the overburden. These low-permeability units behave as an aquitard that can store groundwater, then transmit it slowly downward from one more porous saturated zone to another.

The conceptual model for groundwater flow in the glacial overburden in Operable Unit 4 indicates that the lacustrine strata have good, but slow, hydraulic communication and that the till that underlies the lacustrine strata acts as an aquitard. Groundwater within the approximately 6 m (20 ft) of lacustrine strata is predicted to flow at a lateral rate that is significantly greater than its downward rate. Therefore, groundwater is likely discharging westward to the bank of Paddys Run and southward in the east-west drainageway immediately south of Silo 1.

1.5 ECOLOGY

The FEMP site and surrounding areas lie in a transition zone between two distinct sections of the Eastern Deciduous Forest Province; the Oak-Hickory and the Beech-Maple. The dominant species are oaks, with an abundance of hickeries. The fauna vary little between the two forest sections and include white-tailed deer, gray fox, gray squirrel, white-footed mouse, and short-tailed shrew; the cardinal, woodthrush, summer tanager, red-eyed vireo, and the hooded warbler; the box turtle, common garter snake, and timber rattlesnake.

The Indiana bat is listed as both a federally and state endangered species and occurs in Butler and Hamilton Counties. Surveys were conducted at the FEMP to determine the distribution and presence of the Indiana bat and to identify potential habitat on the FEMP and in the immediate vicinity. The Indiana bat has not been identified at the FEMP. Potential habitat for the Indiana bat occurs in portions of the riparian woodland associated with Paddys Run.

The Sloan's crayfish, a state listed threatened species, has been identified in Paddys Run in northern sections on property and southern sections off property in preliminary surveys in September 1993. Potential harm may occur as a result of siltation and runoff into Paddys Run.

The cave salamander, a state listed endangered species, has not been identified at the FEMP site. Moderate habitat has been identified in a well in the northeastern section of the FEMP and a ravine in the north woodlot.

A site-wide wetland delineation was conducted in February 1993, in accordance with the 1997 United States Army Corps of Engineers (COE) Wetlands Delineation Manual. A jurisdictional determination was approved in August 1993 by the COE that verified wetland boundaries and waters of the United States. Results from the site-wide delineation, subject to COE approval, indicate a total of 14.4 ha (35.9 acres) of wetlands that include 10.6 ha (26.6 acres) of palustrine forested wetlands, 2.8 ha (7 acres) of drainage ditches/swales, and 0.95 ha (2.37 acres) of isolated emergent and emergent-scrub/shrub wetlands (see Figure 1-5).

Floodplains within the FEMP property are confined to the north-south corridor containing Paddys Run. Outside the boundaries of the FEMP site, the 100 year floodplain of the Great Miami River extends west nearly to the eastern boundary of the facility (see Figure 1 6). The 100 year floodplain of the river also extends northward along Paddys Run from the confluence of the two streams to a point about 180 m (600 ft) from the southern boundary of the FEMP site.

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2.0 SITE AND OPERABLE UNIT 4 HISTORY AND ENFORCEMENT ACTIVITIES

2.1 SITE HISTORY

In January 1951, the New York Operations Office of the Atomic Energy Commission (AEC) proceeded on an expedited basis with the selection of a suitable site for the construction of a new feed material production center to supply high purity uranium products. Sixty-three sites were considered with a site near Fernald, Ohio being selected as best meeting established criteria. Construction operations were initiated in May 1951, on the 1050 acre site. The facility was designated the Feed Material Production Center (FMPC) prior to initiation of on-property pilot operations in October 1951. Production operations were initiated in 1952 and continued until July 1989, at which time operations were placed on standby to focus on environmental compliance and waste management initiatives. Following appropriate congressional authorizations, the ficility was formally closed in June 1991. To reflect a new site mission focused on environmental restoration, the name of the facility was changed to the Fernald Environmental Management Project (FEMP) in August 1991.

On March 9, 1985, the EPA issued a Notice of Noncompliance to the DOE identifying EPA's concerns over potential environmental impacts associated with the FEMP's past and ongoing operations. On July 18, 1986, a Federal Facility Compliance Agreement (FFCA) detailing actions to be taken by DOE to assess environmental impacts associated with the FEMP was signed by DOE and EPA. The FFCA was entered into pursuant to Executive Order 12088 (43 FR 47707). The purpose of the FFCA was to ensure compliance with existing environmental statutes and implementing regulations. Also, environmental impacts associated with past and present activities at the FEMP site would be thoroughly and adequately investigated so that appropriate response actions could be implemented. As required by the FFCA, a RI/FS was initiated in July 1986, pursuant to 42 U.S.C. 9601 et seq, CERCLA.

In November 1989, the FEMP was placed on the NPL for investigation and remediation under CERCLA. This placement, in addition to progressive findings in the RI/FS progrmn, necessitated the amendment of the FFCA. The 1986 FFCA was superseded by a Consent Agreement under Sections 120 and 106(a) of CERCLA (Consent Agreement) providing for the implementation of operable units for the FEMP RI/FS and revising the milestone commitments for the RI/FS program without modifying the underlying objectives of the FFCA. The Consent Agreement also provided for the implementation of removal actions to address site conditions which pose an immediate threat to human health and the environment, including removal actions for Operable Unit 4, such as the K-65 Silos Removal Action. The Consent Agreement was signed on April 9, 1990, and became effective on June 29, 1990, following a period of public comment.

In October 1990, the first version of the RI Report for Operable Unit 4 was submitted to the EPA for review and comment. The EPA determined that the FMPC had not adequately characterized Operable Unit 4, and subsequently, issued a Notice of Violation (NOV) against the site. The EPA issued two other NOVs at approximately the same time regarding other components of the ongoing RI/FS. Following negotiations between the EPA and DOE, a resolution agreement was jointly signed by the EPA and DOE. Pursuant to the terms of this resolution agreement, DOE paid a financial penalty to EPA, agreed to perform a supplemental project beneficial to the environment surrounding the site, and also agreed to enter into negotiations with EPA to define new schedules for re submittal of the RI/FS documents.

The Consent Agreement was amended in 1991 to revise the schedules for completing the RI/FS for the five identified operable units. This Amended Consent Agreement was signed on September 20, 1991, and became effective on December 19, 1991, following a period of public comment.

2.2 OPERABLE UNIT 4 HISTORY

Originally constructed in 1951 and 1952, three of the four reinforced concrete storage silos within Operable Unit 4 received by-product materials until 1960. Silos 1 and 2 received K-65 residues generated from the processing of high assay uranium ores, termed pitchblende ores, at the FEMP and the Mallinckrodt Chemical Works (MCW) in St. Louis, Missouri. The pitchblende ores processed at MCW and the vast majority of pitchblende ores processed at the FEMP came primardy from one mine, the Shinkolobwe Mine in the Belgian Congo (now Zaire).

The Shinkolobwe Mine was owned and operated by the African Metals Corporation. These ores contained relatively high concentrations of uranium oxides (U3O8) in the range of 40 to 50 percent as well as high concentrations of radium. Based on the high value of radium at the time, the agreement reached between the AEC and the African Metals Corporation stipulated that the African Metals Corporation would retain ownership of the radium within any processing residues; after the United States had processed the pitchblende ore to extract uranium, the residue would be returned to the African Metals Corporation.

The K-65 silos were constructed at the FEMP site to provide interim storage of the residues, pending the return of the materials to the country of origin. For more than 30 years, these material remained in storage at the FEMP site, under the terms of the original agreement, awaiting transfer. In 1984, ownership of the K-65 residues was transferred to DOE.

As the drums were received by railroad car at the FEMP, from MCW, the drums were temporarily staged in an area to the east of Silos 3 and 4 (Figure 1-3). The drummed material was slurried in the Drum Handling Building, formerly located between Silos 2 and 3, and then pumped to Silos 1 and 2 for storage.

Approximately 31,000 drums of residues generated through MCW processing operations were received at the FEMP. Approximately 24,000 of these drums were transferred to Silo 1, completely filling the structure in November 1953. The remaining 7,000 drums were transferred to Silo 2 for storage.

Additionally, Silo 2 received residues generated at the FEMP from the processing of pitchblende ores from the Shinkolobwe Mine and a small quantity of Australian ores from two mines, the Rum Jungle Mine and the Radium Hill Mine. The last residues were placed in Silo 2 in January 1959. Following the end of K-65 processing operations at the FEMP, approximately 150 drums of radium contaminated material, consisting of soils from drum staging areas, clean-up materials, and excess K-65 samples were placed into Silo 2 in June 1960.

Silos 3 and 4 were constructed in 1952 for storing metal oxides generated by the FEMP refinery. Unlike Silos 1 and 2, which received residues from the processing of ores from mainly one mine, Silo 3 received metal oxides generated from FEMP refinery operations from May 1954, until late 1957. During this period, the FEMP refinery processed the previously mentioned pitchblende ores and uranium ore concentrates received from a number of foreign and domestic uranium mills. Select refinery waste streams were first filtered to remove radium and subsequently directed to an evaporator and calciner. These finely powdered, dried refinery residues (termed cold metal oxides) were transferred to a surge hopper from where the materials were pneumatically conveyed through a pipeline to Silo 3.

Following a programmatic decision in early 1957 to utilize raffinate surface impoundments, the calcining systems were eventually abandoned. As a result of this decision, Silo 4 was never employed for the storage of cold metal oxides or other site materials and remains empty. Inspections completed on Silo 4 during the RI-related site investigations confirmed that no waste materials are present within the silo.

In 1963, it became visually obvious that Silos 1 and 2 were deteriorating. In 1964, site workers repaired the concrete coating around each silo and constructed an earthen berm around them to counterbalance the outward load from the silos contents. The berm also protected the silos walls from weathering and served as a radiation shield. This berm was expanded in 1983 to reduce soil erosion.

Other improvements to Silos 1 and 2 included: sealing the vents in the domes in 1979; installing plywood covers on the domes in 1986; and adding a polyurethane coating in 1987 to reduce weathering and to help lower radon emissions. This coincided with the installation of the radon treatment system (RTS), which was designed to draw air from the silos, remove moisture and radon through a charcoal-adsorption process, and recirculate clean air back into the silos. The RTS, which was upgraded in 1991, helped to lower radon emissions to allow workers to apply a layer of bentonite clay (November 1991) over the K-65 residues within the silos (K-65 Silo Removal Action No. 4).

The bentonite clay layer has reduced the amount of radon escaping from the silos into the environment and would help prevent the release of contaminants into the air if a natural disaster (e.g., a tornado) should occur or if the silo dome should collapse. An expedited removal action was conducted in December 1991 to remove the Silo 3 dust collector after an inspection had revealed significant deterioration of the dust collector (Removal Action No. 21). Also, in April 1991, a time-critical removal action was performed to remove approximately 30,300 liters (8000 gallons) of liquid from the decant sump (Removal Action No. 5).

3.0 COMMUNITY PARTICIPATION

Various forums has been used to provide information to the community, including a periodic newsletter, regular community meetings, and other availability sessions. Other activities included site tours, open houses, a speakers bureau, and fact sheets about the Fernald site. Several readings rooms, which later were consolidated into one facility near the Fernald site, were opened. This reading room contains information about all aspects of the RI/FS at Fernald. In 1990, DOE established an "Administrative Record" for the site; a copy of the Administrative Record also is maintained at the U.S. EPA's Region 5 offices in Chicago.

In November 1993, DOE implemented a public participation program at Fernald, in an attempt to involve community members and other interested parties in the Fernald decision-making process. The public involvement program at Fernald Consists of three elements:

1. Public information
2. Management involvement
3. Person-to-person communication

These efforts, in concert with other community relations activities, such as publication of notices of availability, which are required by law, reflect DOE's new initiative to offer opportunities for interested parties to take part in the decision-making process at Fernald.

3.1 OPERABLE UNIT 4 PUBLIC INVOLVEMENT ACTIVITIES

To encourage stakeholders to review drafts of the Operable Unit 4 RI/FS documents, Notices of Availability for public inspection were published in April 1993 for the Operable Unit 4 RI Report and in September 1993 for the FS/PP-DEIS in three local newspapers: the Cincinnati Enquirer, the Journal-News and The Harrison Press. No public comments were received on the RI Report for Operable Unit 4.

On September 9, 1993, the FS/PP-DEIS were made available at the Public Environmental Information Center, and stakeholders were encouraged to provide informal comments on the preliminary documents. Encouraging public inspection and informal comment on these preliminary documents, prior to EPA approval, provided a genuine opportunity for stakeholders to identify issues, voice their concerns and learn about proposed cleanup plans for Operable Unit 4. The informal opportunity for the public to provide input enabled DOE to address some stakeholder questions and concerns in advance of the formal public comment period.

On October 14, 1993, approximately 29 stakeholders attended a public roundtable on "Proposed Plans and Technology for Operable Unit 4 Remediation." At the roundtable, attendees were invited to offer opinions on the draft final Proposed Plan and the preferred alternative for Operable Unit 4 remediation. These stakeholder comments were documented and evaluated during preparation of the final document.

In addition, a two-way information exchange on the Operable Unit 4 Risk Assessment occurred at the October 19, 1993, Science, Technology, the Environment and the Public (STEP) session on "Risk. Again, Fernald personnel addressed the stakeholders' questions and concerns presented at the meeting. Information about the Operable Unit 4 Remedial Investigation Report was also provided at DOE's October 21, 1993, RI/FS public meeting and at local township trustee meetings.

In response to stakeholder requests at the January 5, 1994, formal public hearing on the Operable Unit 3 (Production Area) Interim Record of Decision, a public roundtable to discuss integration of CERCLA and NEPA was held January 24, 1994. The roundtable included discussions on differences between environmental assessments and environmental impact statements approximately 45 stakeholders attended.

On February 21, 1994, invitations to attend the March 21, 1994, formal public hearing on the FS/PP-DEIS were mailed to 2,000 plus Fernald stakeholders. The Proposed Plan for Remedial Actions at Operable Unit 4 fact sheet was enclosed with each invitation.

On February 24, 1994, advance copies of the Proposed Plan for Remedial Actions at Operable Unit 4 were mailed to several key stakeholders. Also on February 24, copies of the final FS/PP-DEIS and Proposed Plan fact sheets were mailed to the Nevada Operations Office and to Nevada environmental protection organizations. The DOE Operable Unit 4 Branch Chief personally distributed several advance copies of the Proposed Plan to attendees at the February 24, 1994, Fernald Residents for Environmental, Safety, and Health (FRESH) meeting. In addition, she provided an update on Operable Unit 4 activities, plans and progress, and was available for an informal question-and-answer session.

To encourage stakeholders to review and offer input on the final FS/PP-DEIS, a Notice of Availability for formal public comment was published in March 1994 in the Federal Register and three local newspapers: the Cincinnati Enquirer, the Journal-News and The Harrison Press. On March 1, 1994, the Proposed Plan, FS/PP-DEIS became available at the Public Environmental Information Center.

On March 2, 1994, Ohio EPA representatives discussed the FS/PP-DEIS with members of the Fernald Citizens Task Force and FRESH.

On March 4, 1994, a Fernald site news release titled "Key Fernald Cleanup Plan Receives Conditional U.S. EPA Approval" was sent to local electronic and print media, as well as local elected officials, FRESH and the Fernald Citizens Task Force. Articles were published in local newspapers.

On March 7, 1994, the formal 45-day public comment period on the final FS/PP-DEIS officially began.

On March 8, 1994, Fernald representatives met formally with officials of the DOE Nevada Operation Office and Nevada protection agencies.

On March 15, 1994, postcard reminders about the March 21, 1994, formal public hearing were mailed to Fernald stakeholders. In addition, courtesy phone calls were made to key stakeholders, inviting them to the formal public hearing.

Display advertisements announcing the March 21, 1994, formal public hearing were published in three local newspapers: The Cincinnati Enquirer, March 18 and March 20; The Cincinnati Post, March 18; and the Journal-News, March 18.

On March 21, 1994, approximately 80 people attended the formal public hearing on the Operable Unit 4 FS/PP-DEIS. Formal oral public comments were documented by a court reporter and are available in a transcript at the Public Environmental Information Center. In addition, several stakeholders submitted formal written comments. All formal written and oral stakeholder comments and questions asked informally during the March 21 public hearing, as well as DOE's responses, are documented in the Operable Unit 4 Responsiveness Summary.

The formal public comment period for the Operable Unit 4 FS/PP-DEIS was originally scheduled to conclude April 20, 1994. However, the public comment period was extended 30 days, until May 20, 1994, in response to a request for a 60 day extension by a Nevada State Clearinghouse representative.

The extension request was made on behalf of a group of concerned Nevadans, affected indian tribes and local government officials, who, along with officials from the State of Nevada and DOE, jointly participated in the establishment of a site-specific advisory board for the U.S. Department of Energy- Nevada Operations Office (DOE-NV) Environmental Restoration and Waste Management Program at the Nevada Test Site (NTS). "The Citizens Advisory Board for NTS Programs (CAB)" will play a key role in advising DOE-NV about stakeholder concerns involving major program decisions at NTS, such as those proposed for Fernald's Operable Unit 4 waste. CAB's first meeting was held March 8, 1994.

The National Contingency Plan, section 300.430(f) (3)(i) (C) states," ... Upon timely request, the lead agency will extend the public comment period by a minimum of 30 additional days...." In accordance with the Amended Consent Agreement (1991), DOE and U.S. EPA concurred with a 30-day extension of the formal public comment period to minimize impact to the Operable Unit 4 schedule, yet still provide what DOE and EPA considered adequate time for stakeholder review. A Notice of Availability was published May 4 in The Cincinnati Enquirer, the Journal-News and The Harrison Press.

On May 11, 1994, the DOE-NV conducted a public meeting in Las Vegas, Nevada. In attendance were members from the DOE, EPA (Region V), Ohio EPA, CAB and the public. This meeting was the first meeting of the newly-organized CAB. As part of the meeting's agenda, the DOE conducted two presentations. One of the presentations, furnished by the DOE-FN, discussed the Operable Unit 4 FS/PP-DEIS and summarized the proposal to transport and dispose of low-level radioactive waste, which would be generated by the cleanup and environmental restoration of the FEMP site as a whole (including Operable Unit 4), at the NTS. The other presentation was furnished by the DOE-NV which summarized the current low-level radioactive waste management program at the NTS. During the discussions following the presentation of the Operable Unit 4 FS/PP-DEIS, the CAB requested a second 3-day extension of the Operable Unit 4 formal public comment period. DOE and EPA concurred with the second extension of the formal public comment period, which finally concluded June 19, 1994. A Notice of Availability regarding the second 3-day extension was published May 25, 1994, in The Cincinnati Enquirer, the Journal-News and the Harrison Press.

During the Operable Unit 4 formal public comment period, stakeholders expressed concern regarding public participation opportunities and activities after the conclusion of the RI/FS Study process. In 1994, Records of Decision will be completed for Operable Unit 4 and Operable Unit 1 (Waste Pits), and an Interim Record of Decision will be completed for Operable Unit 3 (Production Area).

In 1994, Fernald's Commnnity Relations Plan, which guides public involvement activities, was revised with input from stakeholders who participated in formal in-person and telephone "community assessment" interviews. Fernald's Community Relations Plan is located in the RI/FS Work Plan, Volume III, which is available at the Public Environmental Information Center, 10845 Hamilton-Cleves Highway, Harrison, Ohio (phone: 513-738-0164).

The community assessment interviews were conducted to ensure stakeholder participation in determining public involvement activities and programs during Remedial Design and Remedial Action at Fernald. Fernald's first community assessment was done in 1986, when Fernald's original Community Relations Plan was developed. In 1988, minor revisions were made to the Community Relations Plan and were reflected in the RI/FS Work Plan, Volume III. In 1989, a second community assessment was conducted, and the Community Relations Plan was again revised and approved in August 1990. In 1992, Fernald's Community Relations Plan was revised a fourth time; however, no community assessment was conducted in 1992.

4.0 SCOPE AND ROLE OF REMEDIAL ACTION

The FEMP site and associated environmental issues have been segmented into five operable units. The operable unit concept at the FEMP site involves grouping waste areas or related environmental concerns in a manner so as to permit the more expedient completion of the RI/FS process. The five FEMP operable units are broadly defined as:

- Operable Unit 1 - Waste Pit Area
- Operable Unit 2 - Other Waste Units
- Operable Unit 3 - Former Production Area
- Operable Unit 4 - Silos 1 through 4
- Operable Unit 5 - Environmental Media

Separate RI/FS documentation and RODs are being issued for Operable Units 1 through 5. A sixth operable unit known as the Comprehensive Site-Wide Operable Unit was added as a provision of the Amended Consent Agreement. Operable Unit 6 is not a specified area; however, it was created to perform a final assessment from a site-wide perspective that ongoing or planned remedial actions identified in the RODs for the five operable units will provide a comprehensive remedy for the FEMP site which is protective of human health and the environment.

The primary focus of this remedial action is the permanent disposition of inventoried processing residues contained in three concrete silos and an underground sump at the FEMP. The scope also includes the disposition of contaminated building materials associated with the concrete silos and ancillary support facilities. The action further involves the disposition of contaminated soils, process wastewater perched water encountered within the Operable Unit 4 Study Area. The nature of the residues, coupled with their potential threat of release from their present storage configuration and the potential threat of contaminant migration from the affected soils into the atmosphere and the underlying aquifer system, represent a potential threat to human health and the environment. The purpose of the remedial action is to prevent current and future exposure to the inventoried residues, contaminated soil and debris within Operable Unit 4, and remove the threat of release of hazardous substances into the environment.

Several removal actions are ongoing or have been completed within the Operable Unit 4 study area. These removal actions are summarized as follows:

- Installation of a bentonite clay layer over the K-65 residues in Silos 1 and 2.

- Removal and treatment of water from the K-65 decant sump tank at the FEMP advanced wastewater treatment plant. Water within the tank is removed whenever the liquid level in the sump reaches 80 percent of the tanks capacity.

- Removal of a deteriorated dust collector on the dome of Silo 3.

- Installation of a series of drainage control structures, swales, and culverts to direct surface runoff to the existing in-ground sump.

In addition to the removal actions listed above, polyurethane foam insulation was applied to the exterior of the dome surfaces of Silos 1 and 2 to inhibit wide temperature swings within the silos. These removal actions have been conducted to respond to contaminant releases and to mitigate health and safety threats in accordance with CERCLA. These actions have also been conducted in accordance with Council on Environmental Quality regulations for implementing the provisions of NEPA.

Cleanup decisions for groundwater beneath the Operable Unit 4 Study Area, sediment in Paddys Run, and soil and waste source areas outside the Operable Unit 4 Study Area are not included in the scope of this remedial action. Separate RI/FS and other remediation documentation will be prepared for these facilities and media by other FEMP operable units. These documents will be issued consistent with the terms of the Amended Consent Agreement.

4.1 INTEGRATION OF NEPA INTO CERCLA

For Operable Unit 4 at the FEMP, DOE has chosen to complete an integrated CERCLA/NEPA process. This decision was based on the longstanding interest on the part of local stakeholders to prepare an EIS on the restoration activities at the FEMP and on the recognition that the draft document was issued and public comments received. Therefore, an integrated Feasibility Study/Proposed Plan - Final Environmental Impact Statement (FS/PP-FEIS) has been completed which evaluates alternatives for the treatment and disposal of radioactive residues contained in storage silos at FEMP.

In accordance wth both CERCLA and NEPA processes, this documentation was made available to the public for comment. The contents of the documents prepared for the remedial actions at the FEMP are not intended to represent a statement on the legal applicability of NEPA to remedial actions conducted under CERCLA.

SUMMARY OF OPERABLE UNIT 4 CHARACTERISTICS

Several investigative studies were conducted to determine the characteristics of the contamination sources and the nature and extent of contamination within Operable Unit 4. These investigative activities focused on the following facilities and associated environmental media:

- Silos 1 and 2 and their contents (also termed the K-65 silos)

- Silo 3 and its contents (also termed the cold metal oxide silo)

- Silo 4

- K-65 decant sump tank, its contents, and associated piping

- A radon treatment system (RTS)

- A portion of a concrete pipe trench and other concrete structures

- An earthen berm surrounding Silos 1 and 2

- Soils beneath and immediately surrounding Silos 1, 2, 3, and 4

! groundwater encountered in the vicinity of the silos during implementation of Operable Unit 4 cleanup activities. Note that groundwater within the Great Miami Aquifer underlying the silo area is not within the scope of Operable Unit 4, but it is within the scope of Operable Unit 5.

5.1 INVESTIGATIVE STUDIES

The Operable Unit 4 RI/FS sampling program was the primary source of the information utilized to characterize contamination sources and to evaluate the nature and extent of contamination associated with Operable Unit 4. Other investigative studies which provided characterization data for Operable Unit 4 include the Waste Pit Area Runoff Control Removal Action, the FEMP Environmental Monitoring Program, and the Characterization Investigation Study (CIS). Section 6 provides a list of the contaminants of concern which were identified and used to determine baseline risks attributable to Operable Unit 4.

5.2 SUMMARY DESCRIPTION OF CONTAMINATION SOURCES

5.2.1 Classification of Contamination Sources

The residues in Silos 1, 2, and 3 are classified as by-product material as defined under the AEA of 1954, and are therefore excluded from regulation as solid or hazardous waste under the Resource Conservation and Recovery Act (RCRA), 40 CFR § 261.4(a)(4). By-product material, as defined by the AEA, includes tailings or wastes produced as a result of the extraction or concentration of uranium (U) and thorium (Th) from any ore processed primarily for its source material content (42 United States Code 2014).

Since the residues contained in the silos are excluded from regulation as solid or hazardous waste, the requirements under RCRA are not applicable to Operable Unit 4 remedial actions. However, analytical data for the silo residues indicate that these materials exceed Toxicity Characteristic Leaching Procedure (TCLP) limits for various metals, as defined under RCRA. The silo residues are therefore sufficiently similar to hazardous waste regulated under RCRA resulting in some RCRA requirements being appropriate for the conditions of release or potential release of hazardous constituents during disposal. As a result of this, the relevant and appropriate substantive requirements of RCRA are being applied as part of the Operable Unit 4 remedy for the silo residues.

5.2.2 Source Characteristics

Silos 1 and 2, known as the K-65 silos, contain approximately 6,796 m3 (8,890 yd3) of waste residues generated from processing high-grade uranium ores. As part of the remedial investigation, samples were collected from the contents of the silos. The waste materials within the silos are primarily a silty clay with an average moisture content of approximately 40 percent. Analytical results from these samples confirmed prior process knowledge and identified significant activity concentrations of radionuclides within the uranium decay series.

The average Silo 1 concentration of radium (Ra)-226 is 391,000 pCi/g, thorium (Th)-230 is 60,000 pCi/g, lead (Pb)-210 is 165,000 pCi/g and polonium (Po)-210 is 242,000 pCi/g. The average Silo 2 concentration of Ra-226 is 195,000 pCi/g, Th-230 is 48,300 pCi/g, Pb-210 is 145,000 pCi/g and Po-210 is 139,000 pCi/g. The two silos contain in excess of 3,700 Curies of Ra-226, 600 Curies of Th-230, and 1,800 Curies of Pb-210. It is also estimated that Silos 1 and 2 contain more than 28 metric tons of uranium.

Other significant metals include more than 118 metric tons of barium, 830 metric tons of lead, and 2.6 metric tons of arsenic. TCLP tests indicate that the lead is leachable with leach test concentrations from Silo 1 averaging 614 milligrams per liter (mg/l) and leach test concentrations from Silo 2 averaging 516 mg/l. The silos also contain elevated concentrations of the polychlorinated biphenyls (PCBs) Aroclor-1248 [1.2 milligrams per kilogram (mg/kg)], Aroclor-1257 (7.4 mg/kg), Aroclor-1260 (2.6 mg/kg), and tributylphosphate (15 mg/kg).

Silos 1 and 2 are equipped with a decant sump tank, which was first used to decant liquids from waste slurried into the silos. The system also served to collect silo leachate that entered the Silos 1 and 2 underdrain system. The tank is located beneath the silo berm, between Silos 1 and 2, at a depth approximately 0.6 m (2 ft) below the base of the silos. The decant sump tank is connected to the berm surface via a standpipe. In 1990, personnel noted 1.2 m (4 ft) of liquid in the standpipe. In 1991, and again in February 1993, the desant sump tank was emptied and sampled. Analytical results of the decant sump tank liquids are, in general, consistent with the contents of Silos 1 and 2.

The presence of significant quantities of liquid in the decant sump tank indicates that the system is collecting leachate from the silo underdrain system, as it was designed to do. Excess quantities of liquid in the decant sump tank, causing liquid to overflow into the standpipe, appear to provide a mechanism for leachate from the silos to enter perched groundwater.

Structural evaluations completed in 1986 on Silos 1 and 2 identified a significant loss of the load- carrying capability at the center portion of the domes on both structures. A protective barrier was placed over the deteriorated central portions of the silo domes in 1986 to minimize potential environmental impacts in the event of a catastrophic dome collapse. The remaining structures, Silos 3 and 4, like Silos 1 and 2, are beyond their onginal design life and show visible signs of deterioration due to the effects of weathering. However, based on the more recent February 1994 Silo Structural Integrity Report, the silos are considered to be more structurally sound than previously reported in the 1986 study by Camargo. The extensive non-destructive testing and computer analysis indicated that the silos are not in immediate danger of collapse.

As a natural consequence of the decay of the Ra-226 present in the Silo 1 and 2 waste materials, a radioactive gas, Rn-222, is generated. Samples collected in 1987 from the unfilled, upper portions of Silos 1 and 2 showed a maximum concentration of 30 million picocuries per liter (pCi/l). Average background concentrations of Rn-222 in ambient air are approximately 0.5 pCi/l. In 1991, a layer of bentonite clay was placed over the residues in Silos 1 and 2. This clay layer was insalled to reduce the release of ration gas to the atmosphere. Samples collected following emplacement of the bentonite clay show a significant reduction in the Rn-222 present in the headspace of the silos.

The inventory of radionuclides present in the K-65 residues significantly elevates the direct penetrating radiation field in the vicinity of the silos. Measurements collected from the dome surfaces prior to the installation of the bentonite clay layer showed exposure rates in excess of 200 millirem per hour, or approximately 20,000 times natural background radiation levels. Measurements collected from the surfaces of the domes following bentonite installation showed a greater than 95 percent decrease in the direct radiation fields on the dome surfaces.

Silo 3 contains waste residues, known as cold metal oxides, which were generated at the FEMP site during uranium extraction operations in the 1950s. The residues in Silo 3 are substantially different than those in Silos 1 and 2. First, Silo 3 residues are dry, while the residues in Silos 1 and 2 are moist. Second, while the radiological constituents are similar to those in Silos 1 and 2, certain radionuclides, such as radium, are present in Silo 3 in much lower concentrations. Thus, Silo 3 exhibits a significantly lower direct radiation field and radon emanation rate than Silos 1 and 2.

Samples collected from the contents of Silo 3 confirmed process knowledge and indicated the presence of significant activity concentrations of the radionuclides within the uranium decay series. The predominant constituent identified within Silo 3 was Th-230, a radionuclide produced from the natural radioactive decay of U-238. Distributed within the 3,890 m3 (5,088 yd3) of waste residues inside Silo 3 is approximately 450 Curies of Th-230. Extraction Procedure (EP) Toxicity tests performed on samples of the Silo 3 residues to determine the leachability of inorganic substances present detected eight metals, with the highest mean concentrations being attributed to arsenic (9.48 mg/l), cadmium (0.85 mg/l), chromium (5.05 mg/l), and selenium (2.65 mg/l).

5.3 NATURE AND EXTENT OF CONTAMINATION

Investigations were performed as part of the RI and other site programs to examine the nature and extent of contamination present in environmental media associated with Operable Unit 4. These investigations included the collection and laboratory analysis of samples and the collection of direct field measurements. The investigations included examination of surface and subsurface soil, surface water and sediment, and groundwater.

5.3.1 Surface Soils

Sampling performed as part of the RI/FS and other site programs in the vicinity of Operable Unit 4 indicates the occurrence of above background concentrations of uranium, and to a lesser degree other radionuclides, in the surface soils within and adjacent to the Operable Unit 4 Study Area. Activity concentrations observed during the RI for the surface soils in the vicinity of Operable Unit 4 were as much as 20.8 picocuries per gram (pCi/g) for U-238, or 16 times natural background, and 4.8 pCi/g for Th-230, or two times background. These above background concentrations appear to be generally limited to the upper six inches of soil.

Of the inorganic constituents detected in the Operable Unit 4 surface soils, antimony, beryllium, chromium, copper, magnesium, nickel, silver, and sodium were consistently above background. The only volatile organic compounds detected consisted of common laboratory contaminants. With the exception of one sample collected at a depth of 0.5 to 0.6 m (1.5 to 2.0 ft), which contained elevated concentrations of a number of semivolatile organic compounds including benzo(a)pyrene, semivolatile organic compounds were at or only slightly above the contract required quantitation limit for the laboratory. Available sample data and process knowledge indicate no direct relationship between the surface soil contamination in the Operable Unit 4 Study Area and the silo contents. Further, more than 70 percent of the surface soil samples indicate that the uranium contamination in surface soils is depleted uranium (i.e., the urmium contains depleted percentages of U-235). The silo residues consist of natural uranium. Thus, the existence of these activity concentrations in the surface soils is attributed to air deposition resulting from the form Production Area and past plant production operations and/or waste handling practices in the waste pit area.

Soil samples were collected from the soils contained in the earthen embankment (berm) surrounding Silos 1 and 2. The highest concentrations of radionuclide constituents were detected in a sample taken at a location 9 m (30 ft) below the berm surface, near the base of Silo 1. This sample indicates the occcurrence of either some spillage of silo residues during filling operations or seepage from the silo onto the original surface soils adjacent to the silo at that location. Analytical results from other berm samples showed the presence of radionuclides at relatively lower concentrations, with the majority of samples showing concentrations near background.

The concentration ranges for those constituents in relatively higher concentrations are 0.62 to 417 pCi/g for Pb-210; 1.03 to 943 for polonium (Po)-210; 0.62 to 876 pCi/g for Ra-226; 0.74 to 51.2 pCi/g for Th-230; and 0.75 to 24.7 pCi/g for U-238. Inorganic constituents detected consisted mostly of metals in concentrations close to background concentrations. There were also some organic constituents reported. Most of these constituents are common laboratory contaminants and do not demonstrate any direct linkage to the silo contents.

5.3.2 Subsurface Soils

As part of the RI for Operable Unit 4, samples were collected from the subsurface soils located under and adjacent to the K-65 silos. Analytical results reveal elevated concentrations of radionuclides from the uranium decay series in the soils at the interface between the berm and the original ground level. Elevated concentrations (up to 53 pCi/g for U-238, about 40 times background) were also noted in slant boreholes, which passed in close proximity to the silo underdrains. The occurrence of these above background concentrations in soils near the silo underdrains are attributed to vertical migration of leakage from the silo underdrains or decanting system. Elevated readings at the interface between the silo berms and the native soils may be attributed to historical air deposition or past spillage from the silos during filling operations in the 1950s, prior to installation of the berms.

5.3.3 Surface Water and Sediment

Extensive sampling was conducted on the sediment and surface water present in Paddys Run and on key drainage swales leading to Paddys Run, as part of the RI for Operable Unit 4 and other site programs. Results of the surface water sampling indicate the occurrence of above background concentrations of U-238, up to 1500 times background, in the drainage swales in the vicinity of the Silos 1 through 4. The highest readings were recorded in a drainage ditch, which flows from east to west, located approximately 76 m (250 ft) south of Silo 1. The most probable source of the contamination in Paddys Run and the drainage swales is the resuspension of contaminated particles from surface soils within the Operable Unit 4 and Operable Unit 1 Study Areas into stone water.

5.3.4 Groundwater

Groundwater samples were collected from wells within the Operable Unit 4 Study Area during the RI for Operable Unit 4. Groundwater occurs not only in the Great Miami Aquifer underlying the FEMP site, but also in discrete zones of fine-grained sands located in the glacial overburden. The water contained in these sand packets in the clay-rich glacial soils are termed perched water zones. Samples were collected from slant borings placed adjacent to and under Silos 1 and 2; 1000-series wells screened in the glacial overburden; 2000 series wells screened at the water table in the Great Miami Aquifer; and 3000-series wells screened at approximately the central part of the Great Miami Aquifer, just above the clay interbed.

Background concentrations of naturally occurring inorganics and radionuclides in groundwater in the vicinity of FEMP site were being established under the site-wide RI/FS during the completion of the RI for Operable Unit 4. In accordance with background data available at the time, background concentration of total uranium in groundwater of less than 3 micrograms per liter (μg/l) or 3 parts per billion (ppb) was utilized.

Perched Water

Uranium was the major radionuclide contaminant found in the perched water. Elevated concentrations of total uranium were detected in the slant boreholes under and around Silos 1 and 2. Slant Boring 1617, immediately southwest of Silo 1, contained the highest concentration of total uranium (9,240 μg/l). Uranium concentrations were also elevated in samples collected from the 1000-series wells. The highest observed total uranium concentrations obtained from 1000-series wells were in samples collected from Well No. 1032, located 46 m (150 ft) due west of Silo 2. The range of the concentrations was 196 to 276 μg/l. Considering both the slant borings and 1000-series wells, U-238 was found in the range of 1.1 to 1313 pCi/l.

The major inorganic constituents found in the perched water samples taken from 1000-series wells and the slant borings, included elevated concentrations for major cations (iron, magnesium, manganese, and sodium) and major anions (chloride, nitrate, and sulfate). In particular, the concentrations of sodium, sulfate, and nitrate were significantly above background in slant boring samples. Boring 1615, northwest of Silo 2, had the highest sodium concentration(1,040 mg/l), boring 1618, southeast of Silo 1, had the highest sulfate concentration 2,200 mg/l), and boring 1617 had the highest nitrate concentration (554 mg/l). Low levels of organic constituents, determined to be contaminants, were detected in some samples. Overall, well measurements and analytical results confirmed that the perched groundwater in the vicinity of Operable Unit 4 flows from west to east. Further, contaminants within Operable Unit 4 are contributing to contamination of perched groundwater in this region of the site.

Great Miami Aquifer

The concentration of total uranium in the upper portion of the Great Miami Aquifer, based on analysis of samples from the 2000-series wells, ranged from less than 1 μg/l to 40.3 μg/l. These data do not necessarily suggest that the silos are the source of the observed contamination because both upgradient and downgradient wells contain above background concentrations of total uranium. Well No. 2032, located 46 m (150 ft) west of Silos 1 and 2, exhibited a concentration of total uranium at 39.0 μg/l. Well No. 2033, located 46 m (150 ft) east of Silos 1 and 2, exhibited a concentration of total uranium at 40.3 μg/l. Because groundwater flow in this region of the Great Miami Aquifer is from west to east, these two wells are located upgradient and downgradient of Operable Unit 4, respectively.

The isotopic ratio of U-234 and U-238 would suggest a natural uranium ratio in these samples. Such a ratio may be expected from Operable Unit 4, but is not a "fingerprint" for this source. The presence of uranium upgradient in the aquifer from an Operable Unit 4 source could be explained by leachate travel in the perched groundwater zone of the glacial overburden with emergence to Paddys Run. Here the diluted leachate could enter the aquifer via stream bed infiltration or flow at the perched zone/stream channel interface. No evidence is available to support or preclude this potential route.

The concentration of total uranium measured at deeper levels in the Great Miami Aquifer (3000-series wells) ranged from less than 1 to 4 μg/l, with the exception of 1 sample out of 16, which contained 15 μg/l. Like the 2000-series wells, no conclusion could be drawn that linked this contamination to the silos.

5.4 POTENTIAL EXPOSURE PATHWAYS FOR CONTAMINANT MIGRATION

Contaminant transport from Operable Unit 4 may occur via the following pathways:

- Direct radiation
  - Direct exposure to gamma radiation from radioactive constituents within the silos.
  - Direct exposure to Silo 3 residues under the future source term scenario assuming structural collapse of the silo.
  - Direct exposure to gamma radiation from radioactive constituents in surface soil.
- Air emissions
  - Dispersion of radon that escapes from the silos into the atmosphere.
  - Dispersion of volatile organic compounds (VOC) or fugitive dust emissions generated from soil erosion.
  - Dispersion of Silo 3 contents under the future source term scenario assuming structural collapse of the silo.
- Surface water runoff
  - Erosion of contaminated soils into Paddys Run from the vicinity of the silos.
  - Erosion of released Silo 3 contents under the future source term scenario assuming structural collapse of the silo.
- Groundwater transport
  - Leaching of contaminants from the silo contents via soils to underlying groundwater.

Each of these potential contaminant transport pathways is discussed below. The summary of the baseline risk assessment presented in Section 6 provides additional information about the impacts on environmental media or human receptors.

5.4.1 Direct Radiation

Gamma radiation from the K-65 residues and surface soils are transported as electromagnetic radiation, thus requiring no transport mechanism. As the distance from the K-65 silos and the surface soil source; increases, the magnitude of the radiation's intensity decreases. The soil berms around Silos 1 and 2 provide shielding to potential receptors from the direct gamma radiation associated with the K-65 residues. The bentonite clay layer covering the silo residues decreases the diffusion of radon into the silo headspace. Radon progeny are gamma-emitters that contribute significantly to direct radiation exposure. Therefore, as long as the integrity of the berms, the bentonite clay liner, and silos is maintained, there should be no change or increase in direct radiation exposure due to this pathway.

5.4.2 Air Emissions

Rn-222 generated by the radioactive decay of Ra-226 in the K-65 and metal oxide residues accumulates in the void headspace inside the silos. At the time of their design, the four silos were not required to be airtight; therefore, air exchanges with the outside environment occur. The air exchange is a result of changes in ambient temperatures that cause expansion and contraction of the air mass inside the silos. The foam installed on top of Silos 1 and 2 in 1987 has reduced the K-65 silo breathing losses by limiting daily temperature variations inside the silo dome. In addition to direct release to the atmosphere, radon gas can also diffuse through the K-65 silo walls into the surrounding soil berms. Radon has a short half-life (3.82 days) and is expected to decay into its progeny, Pb-210 and Po-210, in the silo walls and in the soil berms surrounding Silos 1 and 2. These are nonvolatile constituents that accumulate in the soil berms. These progeny could be transported via resuspension if the berms are eroded to a point where this area is exposed.

Contaminated soil particulates can also be resuspended into the air from the surface of the K-65 berms and the surrounding Operable Unit 4 soils and transported by winds to other locations.

5.4.3 Surface Water Runoff

Contaminants in the surface soils can be transported away from Operable Unit 4 through surface soil erosion caused by surface water runoff. If the existing runoff control structures (i.e., trench drains and curb and gutters) at the perimeter of Operable Unit 4 were to fail, this would permit storm water runoff to directly enter Paddys Run. Contaminants contained in near surface soils which are subject to erosion can be transported to Paddys Run by either dissolving in the runoff surface water or attaching to entrained sediment carried by the water. A portion of these contaminants will partition (i.e., separate) into stream sediment and will not be available for immediate transport to the aquifer. Contaminants in the dissolved phase could be transported to the Great Miami Aquifer by recharge from Paddys Run throughout the length of Paddys Run from Operable Unit 4 to the Great Miami River.

5.4.4 Groundwater Transport

The final potential transport route is via groundwater. Contamination may be transported through the vadose zone into the Great Miami Aquifer in the vicinity of Operable Unit 4 by traveling through the glacial overburden present beneath the silos. A conceptual model of potential contaminant transport from the bottom of the silos to the Great Miami Aquifer has been developed. This model is based on the current understanding of the Operable Unit 4 Study Area and data from past investigations and is listed below:

- Leachate derived from Silos 1 and 2 is formed under the current storage configuration of the silos from liquids used to slurry waste materials into the silos. Additional leachate may be formed based on the assumption that precipitation infiltrates the silos through the silo top and sidewalls and interacts with the wastes within. This leachate may pass through the wastes, out the bottom of the silo, and enter the glacial overburden.

- Perched groundwater in the vicinity of Operable Unit 4 flows to the west, toward Paddys Run. Thus, once out of the silo, leachate may migrate through the glacial overburden toward the west, until it reaches Paddys Run, or in a vertical direction until it reaches the Great Miami Aquifer.

- Once in Paddys Run or the Great Miami Aquifer, the contamination can be transported rough surface water or groundwater to either on-property or off-site receptors.

6.0 BASELINE RISK ASSESSMENT

Baseline risk assessments were performed to determine the potential human health effects and ecological risks which could result from exposure to contaminants currently present in Operable Unit 4.

The baseline assessment of human health risks quantified the health risks to hypothetical human receptors due to exposure from chemical sources in Operable Unit 4 under the no-action alternative. The process analyzed the human health consequences that could occur under different scenarios if no remedial actions were taken to address identified environmental concerns. This process utilized a structured, sequential analytical process that:

- Identified the specific Constituents of Concern (COCs) for Operable Unit 4.
- Assessed contaminant transport from the sources to potential exposure points.
- Quantified potential exposures to receptors under current and future land use scenarios.
- Characterized the potential baseline risks associated with Operable Unit 4 under current and potential future land use scenarios.

Appendix D and Section 6.0 of the RI Report for Operable Unit 4 provide detailed information on the baseline assessment of human health risks.

Site-wide baseline ecological risks were evaluated and included in the Site-Wide Characterization Report (DOE 1993b). An overview of that discussion is included in Section 6.2 of this ROD. The purpose was to conduct a qualitative assessment of the potential current and future risks posed by FEMP site contaminants to ecological receptors (e.g., plants and animals) if no remediation is implemented, thus, serving as a baseline for all future assessments. The Amended Consent Agreement between EPA and DOE stipulates that Operable Unit 5 is responsible for the preparation of the Site-Wide Ecological Risk Assessment as part of the RI and FS Reports for Operable Unit 5.

6.1 SUMMARY OF THE BASELINE ASSESSMENT OF RISKS TO HUMAN HEALTH

6.1.1 Constituents of Concern

The COCs for human health and their ranges of concentration in effected Operable Unit 4 media are provided in Table 6-1. COCs were detected in Silos 1, 2, and 3, the surrounding surface soil and subsurface soil, and the silo berm soils. Baseline risk assessment source term concentrations were determined for the COCs in these media. Fate and transport modeling was then conducted to estimate the exposure point concentrations of contaminants in environmental media (e.g., groundwater, air, and surface water). Contaminants with the potential of posing risk to human health include radionuclides, metals, inorganic anions, polyaromatic hydrocarbons (PAHs), and pesticides/polychlorinated biphenyls (PCBs). The selection of COCs was based on the evaluation of characterization data with respect to the distribution on contaminants in various media and the potential contribution of these contaminants to the overall human health effects. Appendix E of the RI Report for Operable Unit 4 provides full details of the process for selecting COCs.

6.1.2 Exposure Assessment

The exposure assessment and baseline risk assessment follow the methodology described in the Risk Assessment Work Plan Addendum (DOE 1992), with the exception of those items identified in Section D.1.0 of Appendix D of the RI Report for Operable Unit 4 (DOE 1993a). Baseline risks were calculated under a number of contaminant release mechanisms providing exposure to hypothetical receptors under three separate land use scenarios. Baseline risks under these land use scenarios were calculated for a current source term and a future source term. The concentrations of contaminants found in the contents of Silos 1, 2, and 3, the surrounding surface soil, the silo berm soil, and subsurface soil within the Operable Unit 4 Study Area were used to determine the source term concentrations used in each exposure scenario.

Land use scenarios include: (1) current land use without access controls, (2) current land use with access controls, and (3) future land use without access controls. Under the first scenario, the FEMP site is assumed to be managed by an industrial concern other than DOE. Access restrictions currency provided by DOE are assumed to be discontinued. In addition, no remedial actions are assumed to have been taken, and no members of the public establish residence within the boundaries of Operable Unit 4. Thus, potential receptors include an off-property resident farmer, a trespassing child, an on-property worker (groundskeeper), and an off-property user of surface water from the Great Miami River.

TABLE 6-1 CONSTITUENTS OF CONCERN FOR OPERABLE UNIT 4

Range of Detection for Chemicals (mg/kg)	Silo 1 & 2	Silo 3	Surface Soil	Berm Soil
2-Butanone	0.002-0.022		0.002-0.008	0.011a
2-Hexanone	0.002-0.017			
2-Nitrophenol		.052a		
4,4'-DDE	0.029-0.120			
4,4'-DDT	0.014-0.068			
4-Methyl-2-pentanone	0.002-0.003			
4-Nitrophenol		.045a		
Acenaphthylene			1.30a	
Acetone	0.033-0.150		0.004-0.079	0.064a
Aldrin	0.056a			
Ammonia	1.100-8.90			
Anthracene			0.780a	
Antimony	13.300-77.4		22.60-32.30	19.100-24.900
Aroclor-1248	1.700-10.0			
Aroclor-1254	0.420-20.0			
Aroclor-1260	0.340-3.50			
Arsenic	3.100-1960	532-6380	2.70-9.50	5.000-8.000
Barium	89.20-22100	118.000-332.000	44.7-113.0	47.100-89.400
Benzo(a)anthracene			0.062-4.70	
Benzo(a)pyrene			5.20a	
Benzo(b)fluoranthene			0.150-9.70	
Benzo(g,h,i)perylene			5.30a	
Benzoic Acid	0.075-0.390		0.059a	
Beryllium	0.590-6.00	10.000-39.900	0.670-1.00	0.670-0.850
Bis(2-ethylhexyl)phthalate	0.070-6.00		0.075-1.60	
Boron	18.400-81.20			
Cadmium	0.560-19-1	21.500-204.000	4.70-6.20	2.600-4.200
Carbon tetrachloride	0.170a			
Chromium	0.207-165	139-560	10.20-22.60	16.400-28.400
Chrysene			0.062-3.50	
Cobalt	6.20-2430	1100-3520		
Copper	122-1790	1610-7060	16.200-23.50	19.300-23.800
Cyanide	0.520-7.10		0.120a	0.120a
Di-n-butyl phthalate	0.046-0.057		0.190a	0.048a
Di-n-octyl phthalate	0.045-0.970			
Dieldrin	0.093a			
Diethyl phthalate	0.410a			
Dimethyl phthalate	0.068-0.160			
Endosulfan-II	0.082-0.260			
Endosulfan-I	0.011-0.092			

Table 6-1
(continued)

	Silo 1 & 2	Silo 3	Surface Soil	Berm Soil
Range of Detection for Chemicals (mg/kg)				
Endrin	0.089a			
Fluoranthene	0.064a		0.040-6.70	
Fluoride	15.0-394			
Heptachlor epoxide	0.022-0.20			
Indeno(1,2,3-cd)pyrene			4.20a	
Lead	153-299000	646-4430		
Manganese		2420-6500		
Mercury	0.150-2.80	0.300-0.690		
Methylene chloride	0.015-0.190		0.025a	
Molybdenum	148-8600		3.60-4.90	2.400-13.300
N-nitroso-di-n-propylamine	0.059-0.260			
Nickel	14.60-3380	1760-6170	22.8-38.9	21.700-32.400
Nitrate	2216-8900			
Phenanthrene			2.60a	
Phenol	0.40a		0.230a	0.110a
Phosphorus	0.40-3290			
Pyrene	0.047a		0.045-8.20	
Selenium	49.60-2810	101.000-349.000		
Silver	5.0-34.9	9.200-23.800	6.60-9.70	5.880-14.400
Tetrachlorethene	0.140a			
Thallium	0.090-5.700	4.000-73.900	0.510a	0.710a
Toluene	0.002-0.190		0.001a	0.002-0.200
Total xylenes	0.003a			0.069a
Tributyl Phorphate	0.200-73.00			
Uranium	137.0-8394.0	738.0-4554.0	4.0-64.0	10.50-12.40
Vanadium	21.90-535.00	418-4550	15.9-27.7	24.600-28.400
Zinc	7.70-212.00	301-672	32.9-65.2	44.200-59.600

Table 6-1
(continued)

	Silo 1 & 2	Silo 3	Surface Soil	Berm Soil
Range of Detection for Radionuclides (pCi/g)				
Actinium-227	2905.0-17390	234.0-1363		
Cesium-137				0.23a
Lead-210	48980.0-399200	454.0-6427		0.98-4.45
Polonium-210	55300-43400			1.68-4.70
Protactinium-231	4041a	266.0-931		
Radium-224		64.00-453.00		1.020a
Radium-226	657.0-890700	467.0-6435	0.6-2.3	1.04-6.68
Radium-228		82.0-559	0.5-1.7	0.8-0.98
Strontium-90			0.8-1.8	
Technetium-99			1.2-3.6	
Thorium-228	411.0-7360	459.0-966	0.9-1.4	1.12-1.52
Thorium-230	8365.0-132800	21010.0-71650	1.4-4.8	1.69-4.78
Thorium-232	661.0-1106	411.0-1451	0.9-1.7	0.86-1.45
Uranium-234	89.0-1548	348.0-1935	2.4-6.9	1.26-3.62
Uranium-235/236	19.1-172	42.0-158		
Uranium-238	46.0-1925	320.0-2043	2.4-20.8	1.13-4.19

a -only one sample was found to be above the detection limit.

Under the second scenario, the site access restrictions historically provided by DOE are assumed to be maintained, and no remedial actions are assumed to have been taken. The scenario further assumes that no members of the public have established residence in the Operable Unit 4 Study Area, and that DOE maintains a site-specific health and safety program to ensure that non-remediation workers and visitors are properly protected. Therefore, the risk assessment addresses workers subjected to short exposure durations under controlled conditions. These controls include engineered emission control equipment, personnel protective equipment, and administrative health and safety practices. Potential receptors under this scenario include an off-property resident farmer, a trespassing child, and an off-property user of surface water from the Great Miami River.

The third land-use scenario, future land use without access controls, includes exposure routes that require development time, such as establishing a home and farm within Operable Unit 4. Access controls are assumed to be absent and no remedial actions are assumed to have been taken. In addition, members of the public are assumed to have established a residence within the Operable Unit 4 boundaries. Hypothetical receptors under this scenario are a reasonable maximum exposure (RME) on-property resident farmer, a central tendency (CI) on-property resident farmer, an go-property resident child, an off-property resident farmer, and an off-property user of surface water from the Great Miami River.

In addition to the three land use scenarios, there are two source term scenarios: the current source- term scenario and the future source term scenario. The current source term scenario considers the silos as they exist today. The future source term scenario considers complete structural failure of Silo 3, resulting in the spread of its contents to Operable Unit 4 surface soil, and dome collapse for Silos 1 and 2, consequently exposing their contents to the elements and increasing leaching of the contents through the interception of rainwater.

Under the current land use scenario without access control and the future land use scenario, risks are calculated using both the current source term and the future source term. Under the current land use with access control scenario, the future source term does not apply; if the site remains under the institutional control of DOE, the assumption is made that measures would be undertaken to maintain the current configuration of the silos and implement mitigative action in the event of silo failure. Thus, under the current land use with access control scenario, risk was calculated only for the current source term.

The on-property resident farmer receptor was also evaluated using exposure and intake parameters such as exposure duration, which represents the CT of risk. This was performed in response to new guidance from EPA, which suggests that all risk assessments provide an evaluation of the CT of the risk range, using the best information available to describe the average situation (EPA 1992a). This scenario is used to provide an estimate of risk closer to average for the resident adult scenario. This receptor scenario is currently being developed by EPA and will require additional review as guidance becomes available. The CT receptor for this scenario is located at the same location as the RME on-property resident farmer receptor. Table 6-2 provides a summary of the land use/source term/receptor scenarios used for the Baseline Risk Assessment.

Exposure pathways quantified in the risk assessment for each scenario are shown in Figures 6-1 and 6-2 and are discussed in greater detail in Appendix D of the RI Report for Operable Unit 4. A summary of exposure pathways that have the most impact to site risks is presented in Section 6.1.4. The conceptual model depicted in Figures 6-1 and 6-2 indicates which exposure routes are quantitatively evaluated in the risk assessment for each receptor and land use scenario, and the basis for excluding other exposure routes. Exposures to the RME resident farmer due to the ingestion of groundwater consider two scenarios, which include water obtained from the Great Miami Aquifer and water obtained from perches water beneath and west of Silos 1 and 2.

Section 5.0 and Appentix E of the RI Report for Operable Unit 4 address in detail all fate and transport modeling efforts employed in the determination of exposure point concentrations of the COCs. Appendix D of the RI Report for Operable Unit 4 discusses the assumptions regarding source term and potential release mechanisms upon which the fate and transport modeling is based.

6.1.3 Toxicity Assessment

The human health hazards identified in the toxicity assessment are cancer induction and chemical toxicity. Chemical toxicity includes numerous health effects such as kidney damage, liver disease, or eye irritation. For both types of health hazards, dose-response data from human and animal studies are used to determine the potency of the individual radionuclides and chemicals.

Intakes calculated in the exposure assessment are used in conjunction with the cancer slope factor from the dose-response data to determine the incremental lifetime cancer risk (ILCR). Toxicity data for the Operable Unit 4 risk assessment were taken from the Integrated Risk Information System

TABLE 6-2

SUMMARY OF LAND-USE/RECEPTOR/SOURCE TERM SCENARIOS

LAND USE	RECEPTORS CURRENT SOURCE TERM	 FUTURE SOURCE
Current Land Use Without Access Control	Off-Property Farmer, Trespassing Child, Groundskeeper Worker, Off-Property User of Surface Water from the Great Miami River	Off-Property Farmer, Trespassing Child, Groundskeeper Worker, Off-Property User of Surface Water from the Great Miami River
Current Land Use With Access Control	Off-Property Farmer, Trespassing Child, Off-Property User of Surface Water	N/A
Future Land Use	RME On-Property Resident Farmer, CT On-Property Resident Farmer, On Property Resident Child, Off-Property Farmer, Off-Property User of Surface Water from the Great Miami River	RME On-Property Resident Farmer, CT On-Property Resident Farmer, On Property Resident Child, Off-Property Farmer, Off-Property User of Surface Water from the Great Miami River

Notes: N/A Not Applicable
RME Reasonable Maximum Exposure
CT Central Tendency

<IMG SRC 0595287G>
<IMG SRC 0595287H>

(IRIS, EPA 1992a) and the updated Health Effects Assessment Summary Table (HEAST, EPA 1992b). Cancer slope factors have been developed by the EPA for estimating ILCRs associated with exposure to carcinogenic chemicals. The slope factors, which are expressed in units of milligrams per kilograms-day (mg/kg-day)-1, are multiplied by the estimated intake of a carcinogen, in mg/kg-day, to provide an upper bound estimate of the ILCR associated with exposure at that intake level. The term "upper-bound" reflects the conservative estimate of the risks calculated from the slope factor. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Cancer slope factors are derived from the results of human epidemiological studies, or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied. Tables 6-3 and 6-4 provide the cancer slope factors for Operable Unit 4 chemical COCs and radiological COCs respectively.

For cancer induction, it is assumed that no dose threshold exists. Therefore, for any dose of a carcinogen, there exists a possibility, however small, of contracting cancer. Incremental lifetime cancer risks are expressed in terms of the probability that a given receptor (person) will contract cancer due to the calculated exposures. For example, if the receptor has an additional 1 chance in 10,000 of contracting cancer due to the calculated exposures, the probability of developing cancer is expressed as a 10-4 (1 in 10,000) risk. However, these risk factors should only be used to make a qualitative estimate of individual receptor impact, because the risk coefficients are intended for predicting cancer in a large population.

For chemical toxicants, the data suggests a dose threshold or reference dose (RfD) exists below which no toxic effect is observed. RfDs have been developed by the EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting non-carcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD). RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse non-carcinogenic effects to occur. Table 6-5 provides the RfDs for Operable Unit 4 COCs.

To determine if the exposure levels of Operable Unit 4 constituents may cause adverse health effects, the estimated intake of a particular constituent (calculated from the exposure assessment) is compared to the RfD, which, defines the acceptable intake. If the ratio of estimated intake to the acceptable intake is greater than one, the site-related intake may cause toxic effects. This ratio is called the Hazard Quotient (HQ). When HQs for multiple COCs are summed, the resultant value is the Hazard Index (HI).

TABLE 6-3

CANCER SLOPE FACTORS FOR CARCINOGENIC EFFECTS OF CONSTITUENTS OF CONCERN
FOR OPERABLE UNIT 4

Chemical	Oral Cancer Slope Facter (mg/kg/day)-1	Inhalation Cancer Slope Factor (mg/kg/day)-1a	Tumor Site Oral	 Inhalation	Cancer Classification ab	Reference
Inorganics						
Ammonia	NDc	ND	ND	ND	ND	ND
Antimony	ND	ND	ND	ND	D	d
Arsenic	1.75	15	skin	respiretory tract	A	e
Barium	ND	ND	ND	ND	D	d
Beryllium	4.3	8.4	gross tumors	lung	B2	e
Boron	ND	ND	ND	ND	ND	ND
Cadmium (food)	ND	6.3	ND	respiratory tract	B1	e
Cadmium (water)	ND	6.3	ND	respiratory tract	B1	e
Chromium (VI)	ND	42	ND	lung	A	e
Cobalt	ND	ND	ND	ND	ND	ND
Copper	ND	ND	ND	ND	D	e
Cyanide	ND	ND	ND	ND	D	e
Fluoride	ND	ND	ND	ND	ND	ND
Lead	ND	ND	kidney	ND	B2	e
Manganese	ND	ND	ND	ND	D	e
Mercury	ND	ND	ND	ND	D	e
Molybdenum	ND	ND	ND	ND	D	d
Nickel	ND	0.84	ND	respiratory tract	A	e
Nitrate	ND	ND	ND	ND	ND	ND
Phosphorus	ND	ND	ND	ND	D	e
Selenium	ND	ND	ND	ND	D	e
Silver	ND	ND	ND	ND	D	e
Thallium compounds	ND	ND	ND	ND	ND	e

TABLE 6-3
(Continued)

Tumor Site

Chemical	Oral Cancer Slope Facter (mg/kg/day)-1	Inhalation Cancer Slope Factor (mg/kg/day)-1a	Oral	Inhalation	Cancer Classification ab	Reference
Uranium	ND	ND	ND	ND	ND	f
Vanadium	ND	ND	ND	ND	ND	d
Zinc	ND	ND	ND	ND	D	e
Volatiles						
2-Butanone	ND	ND	ND	ND	D	e
2-Hexanone	ND	ND	ND	ND	ND	ND
4-Metyl-2-pentanone	ND	ND	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	D	e
Carbon tetrachloride	0.13	0.053	liver	ND	B2	e
Methylene chloride	0.0075	0.0016	liver	lung, liver	B2	e
Tetrachloroethene	0.052	0.002	lung	lung	B2-C	g
Toluene	ND	ND	ND	ND	D	e
Total xylenes	ND	ND	ND	ND	D	e
Semivolatiles						
Acenaphthylene	ND	ND	ND	ND	D	e
Aldrin	17	17	liver	ND	B2	e
Anthracene	ND	ND	ND	ND	D	e
Benzo(a)anthracene	7.3	6.1	ND	ND	B2	h
Benzo(a)pyrene	7.3	6.1	stomach	respiratory tract	B2	e,g
Benzo(b)fluoranthene	7.3	6.1	ND	ND	B2	h
Benzo(g,h,i)perylene	ND	ND	ND	ND	D	e
Benzoic acid	ND	ND	ND	ND	D	e
bis(2-Ethylhexyl)phthalate	0.014	ND	liver	ND	B2	e
Chrysene	7.3	6.1	. Iymphoma, skin	ND	B2	h
Di-n-butylphthalate	ND	ND	ND	ND	D	e

TABLE 6-3
(Continued)

Tumor Site

Chemical	Oral Cancer Slope Facter (mg/kg/day)-1	Inhalation Cancer Slope Factor (mg/kg/day)-1a	Oral	Inhalation	Cancer Classification ab	Reference
Di-n-octylphthalate	ND	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene	7.3	6.1	ND	ND	B2	h
Diethyl phthalate	ND	ND	ND	ND	D	e
Dimethyl phthalate	ND	ND	ND	ND	D	e
Fluoranthene	ND	ND	ND	ND	D	e
Indeno(1,2,3-cd)pyrene	7.3	6.1	ND	ND	B2	h
2-Nitrophenol	ND	ND	ND	ND	ND	ND
4-Nitrophenol	ND	ND	ND	ND	ND	ND
N-Nitroso-di-n-propylamine	7	ND	multiple	ND	B2	e
Phenanthrene	ND	ND	ND	ND	D	e
Phenol	ND	ND	ND	ND	D	e
Pyrene	ND	ND	ND	ND	D	e
Tributyl phosphate	ND	ND	ND	ND	D	i
Pesticides/PCBs						
Aroclor-1248	7.7	ND	liver	ND	B2	i
Aroclor-1254	7.7	ND	liver	ND	B2	i
Aroclor-1260	7.7	ND	liver	ND	B2	e
4,4'-DDE	0.34	ND	liver	ND	B2	e
4,4'-DDT	0.34	0.34	liver	ND	B2	e
Dieldrin	16	16	liver	ND	B2	e
Endosulfan I	ND	ND	ND	ND	ND	ND
Endosulfan II	ND	ND	ND	ND	ND	ND
Endrin	ND	ND	ND	ND	D	d
Heptachlor epoxide	9.1	9.1	liver	ND	B2	e

TABLE 6-3
(Continued)

Tumor Site

Chemical	Oral Cancer Slope Facter (mg/kg/day)-1	Inhalation Cancer Slope Factor (mg/kg/day)-1a	Oral	Inhalation	Cancer Classification ab	Reference
---------------						

a Derived from inhalations unit risk.
b Cancer weight-of-evidence Group A = human carcinogen; Group B1 and B2 = probable human carcinogen;
Group C = possible human carcinogen; Group D - not classifiable as to carcinogenicity to humans; Group E = evidence of noncarcinogenicity to humans
c ND - no data
d EPA - 1993b, "Drinking Water Regulations and Health Advisories"
e Integrated Risk Information System (IRIS), 1993 (EPA 1993a) current as of April 1993
f The carcinogenicity of uranium is attributed to its radioactivity; see Appendix D of the Operable Unit 4 Remedial Investigation.
g EPA, Health Effects Assessment Summary Table (HEAST) (EPA 1992a).
h The oral and inhalation cancer slope factors for benzo(a)pyrene are used for the other polyaromatic hydrocarbons assigned to cancer classification B2 (see the toxicological profile for polyaromatic hydrocarbons of Appendix D from the Operable Unit 4 Remedial Investigsation for additional information).
i EPA, 1993d, Memorandum from J. Dollarhide ECAO to P. V, 7/21/93, including Attachments 1-6.

TABLE 6-4

CANCER SLOPE FACTORS FOR OPERABLE UNIT 4 RADIONUCLIDES OF CONCERN

Radionuclide	ICRP Lung Classb	Inhalation (pCi)-1	GI Absorption Factor (f1)	Ingestion (pCi)-1	Penetrating External Exposure (pCi.yr/g)-1
Uranium - 238 Series					
U-238 + 2 dtrs	Y	5.2 x 10-8	5.0 x 10-2	2.8 x 10-11	3.6 x 10-8
U-234	Y	2.6 x 10-8	5.0 x 10-2	1.6 x 10-11	3.0 x 10-11
Th-230	Y	2.9 x 10-8	2.0 x 10-4	1.3 x 10-11	5.4 x 10-11
Ra-226 + 5 dtrs	W	3.0 x 10-9	2.0 x 10-1	1.2 x 10-10	6.0 x 10-6
Rn-222 + 4 dtrs	Gas	7.7 x 10-12	1.0 x 100	1.7 x 10-12	5.9 x 10-6
Pb-210 + 2 dtrs	D	4.0 x 10-9	2.0 x 10-1	6.6 x 10-10	1.6 x 10-10
Uranium - 235 Series					
U-235 + 1 dtr	Y	2.5 x 10-8	5.0 x 10-2	1.6 x 10-11	2.4 x 10-7
Pa-231	Y	3.6 x 10-8	1.0 x 10-3	9.2 x 10-11	2.6 x 10-8
Ac-227 + 7 dtrs	Y	8.8 x 10-8	1.0 x 10-3	3.5 x 10-10	8.5 x 10-7
Thorium - 232 Series					
Th-232	Y	2.8 x 10-8	2.0 x 10-4	1.2 x 10-11	2.6 x 10-11
Ra-228 + 1 dtr	W	6.9 x 10-10	2.0 x 10-1	1.0 x 10-10	2.9 x 10-6
Th-228 + 7 dtrs	Y	7.8 x 10-8	2.0 x 10-4	5.5 x 10-11	5.6 x 10-6
Fission Products					
Tc-99	W	8.3 x 10-12	8.0 x 10-1	1.3 x 10-12	6.0 x 10-13
Sr-90 + 1 dtr	D	6.2 x 10-11	3.0 x 10-1	3.6 x 10-11	0.0 x 100

a EPA, Health Effects Assessment Summary Tables, Annual FY 1992 including the July 1992 and November 1992 supplements (EPA
b Classification recommended by the ICRP for half-time for clearance from the lung. "Y" = years, "W" = weeks, "D" = days.

TABLE 6-5

REFERENCE DOSES FOR NONCARCINOGENIC EFFECTS OF CONSTITUENTS OF CONCERN
FOR OPERABLE UNIT 4

			Target Organ		Uncertainty Factor	
Chemical	Oral Reference Dose (mg/kg/day)	Inhalation Reference Dose (mg/kg/day)a	Oral	Inhalation	Oral	Inhalation
Inorganics						
Ammonia	ND	0.029b	ND	Respiratory system	ND	30
Antimony	0.0004b	NDc	Liver	ND	1000	ND
Arsenic	0.0003b	ND	skin	ND	3	ND
Barium	0.07b	0.00014d	Cardiovascular system	Fetus	3	1000
Beryllium	0.005b	ND	ND	ND	100	ND
Boron	0.09b	0.0057d	Testis	Respiratory system	100	100
Cadmium (food)	0.001b	ND	kidney	Cancer (see Table 6-3)	10	ND
Cadmium (water)	0.0005b	ND	Kidney	Cancer (see Table 6-3)	10	ND
Chromium (VI)	0.005b	ND	ND	ND	500	ND
Cobalt	0.06a	0.0000003f	Cardiovascular system	Respiratory system	ND	1000
Copper	ND	ND	ND	ND	ND	ND
Cyanide	0.02b	ND	Central nervous system	ND	500	ND
Fluoride	0.06b	ND	Teeth	ND	1	ND
Lead	ND	ND	Central nervous system	Central nervous system	ND	ND
Manganese	0.14 (food)b	0.00011b	Central nervous system	Respiratory system	1	300
Manganese	0.005 (water)b	0.00011b	Central nervous system	Respiratory system	1	300
Mercury	0.0003d	0.000086d	Kidney	Central (see Table 6-3)	1000	30
Molybdenum	0.005b	ND	Liver	ND	30	ND
Nickel	0.02b	ND	ND	Cancer (see Table 6-3)	300	ND
Nitrate	1.6b	ND	Blood	ND	1	ND

TABLE 6-5
(Continued)

Chemical	Oral Reference Dose (mg/kg/day)	Inhalation Reference Dose (mg/kg/day)a	Target Organ Oral	Target Organ Inhalation	Uncertainty Factor Oral	Uncertainty Factor Inhalation
Inorganics						
Phosphorus	0.00002b	ND	Reproductive systm	ND	1000	ND
Selenium	0.005b	ND	Skin	ND	3	ND
Silver	0.005b	ND	ND	ND	3	ND
Thallium	0.00006b,g	ND	Central nervous system	ND	3000	ND
Uranium	0.003b	ND	kidney	ND	1000	ND
Vanadium	0.007d	ND	ND	ND	100	ND
Zinc	0.3b	ND	Blood	ND	3	ND
Volatiles						
2-Butanone	0.05d	0.3b	ND	Fetus	1000	1000
2-Hexanone	0.04b	ND	ND	ND	ND	ND
4-Metyl-2-pentanone	0.05d	0.023d	Liver	Liver	1000	1000
Acetone	0.1b	ND	Liver	ND	1000	ND
Carbon tetrachloride	0.0007b	0.00057h	Liver	ND	1000	ND
Methylene chloride	0.06b	0.86d	Liver	Liver	100	100
Tetrachloroethene	0.01b	ND	Liver	ND	1000	ND
Toluene	0.2b	0.11d	Liver	Central nervous system	1000	300
Total xylenes	2b	ND	Central nervous systme	ND	100	ND
Semivolatiles						
Acenaphthylene	ND	ND	ND	ND	ND	ND
Aldrin	0.00003b	ND	Liver	ND	1000	ND
Anthracene	0.3b	ND	ND	ND	3000	ND

TABLE 6-5
(Continued)

Chemical	Oral Reference Dose (mg/kg/day)	Inhalation Reference Dose (mg/kg/day)a	Target Organ		Uncertainty Factor	
			Oral	Inhalation	Oral	Inhalation
Benzo(a)anthracene	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	ND	ND	ND	ND	ND	ND
Benzoic acid	4b	ND	ND	ND	1	ND
bis(2-Ethylhexyl)phthalate	0.02b	ND	Liver	ND	1000	ND
Chrysene	ND	ND	ND	ND	ND	ND
Di-n-butylphthalate	0.1b	ND	ND	ND	1000	ND
Di-n-octylphthalate	0.2d	ND	Liver	ND	1000	ND
Dibenzo(a,h)anthracene	ND	ND	ND	ND	ND	ND
Diethyl phthalate	0.8b	ND	ND	ND	1000	ND
Dimethyl phthalate	10d	ND	Kidney	ND	10	ND
Fluoranthene	0.04b	ND	Kidney	ND	3000	ND
Indeno(1,2,3-cd)pyrene	ND	ND	ND	ND	ND	ND
2-Nitrophenol	ND	ND	ND	ND	ND	ND
4-Nitrophenol	0.008b	ND	ND	ND	ND	ND
N-Nitroso-di-n-propylamine	ND	ND	ND	ND	ND	ND
Phenanthrene	ND	ND	ND	ND	ND	ND
Phenol	0.6b	ND	Fetus	ND	100	ND
Pyrene	0.03b	ND	Kidney	ND	3000	ND
Tributyl phosphate	0.005b	ND	ND	ND	ND	ND

TABLE 6-5
(Continued)

Chemical	Oral Reference Dose (mg/kg/day)	Inhalation Reference Dose (mg/kg/day)a	Target Organ Oral	Target Organ Inhalation	Uncertainty Factor Oral	Uncertainty Factor Inhalation
Pesticides/PCBs						
Aroclor-l248	0.00007b,i	ND	Fetus	ND	100	ND
Aroclor-1254	0.00007b,i	ND	Fetus	ND	100	ND
Aroclor-1260	0.00007b,i	ND	Fetus	ND	100	ND
4,4'-DDE	ND	ND	ND	ND	ND	ND
4,4'-DDT	0.0005b	ND	Liver	ND	100	ND
Dieldrin	0.00005b	ND	Liver	ND	100	ND
Endosulfan I	0.00005i	ND	Kidney	ND	3000	ND
Endosulfan II	0.00005i	ND	Kidney	ND	3000	ND
Endrin	0.0003b	ND	Liver	ND	100	ND
Heptachlor epoxide	0.000013b	ND	Liver	ND	1000	ND

a Derived from inhalation RfC.
b Integrated Risk Information Syetem (IRIS) (EPA 1993') current as of April 1993.
c ND - no data.
d EPA, Health Effects Assessment Summary Tables, (HEAST) Annuel FY 92 including July and November Supplements (EPA 1992a).
e EPA 1992e Memorandum from D. L. Forman, U.S. EPA Region VII, Philadelphia, Pennsylvania, "Subject: Cobalt Toxicity," dated March 12, 1992.
f EPA 1990c, Memorandum from Pei-Fung Hurst, ECAO, Cincinnati, Ohio, to R. Riccio, U.S. EPA Rogion III, Philadelphia, Pennsylvania, "Subject: Toxicity of Cobalt (Halby Chemical/Wilmington, Delaware)," dated October 9, 1990.
g Derived by analogy to thallium sulfate, adjusting for differences in molecular weight.
h EPA 1993c
i Based on anology to Aroclor - 1016.
j EPA, 1993e, Health Effects Assessment Summary Tables, (HEAST), March, 1993.
k EPA, 1993d, Memorandum from J. Dollarhide, ECAO to P. VanLeeuwen, Region V, 7/21/93.

6.1.4 Risk Characterization Results

Excess lifetime cancer risks are determined by multiplying the intake level with the cancer potency factor. These risks are probabilities that are generally expressed in scientific notation (e.g. 1 x 10-6 or 1E-6). An excess lifetime cancer risk of 1 x 10-6 indicates that, as a plausible upper bound, an individual had a one in one million chance of developing cancer as result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site.

Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the HQ (or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose). By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the HI can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media.

Tables 6-6 and 6-7 shows the baseline risks and HIs for each hypothetical receptor by land use and source term scenario. Risk values in Table 6-6 are reported in units of ILCR for radiological, chemical, and total risk. The chemical HI, which has no units, is presented in Table 6-7.

6.1.4.1 Current Land Use Without Access Control/Current Source-Term Scenario

The receptor with the greatest total radiological risk is the trespassing child (Table 6-6). The greatest contributor under this scenario is from exposure to external radiation while the receptor is on top of the Silo 1 or 2 dome (5 x 10-3). In addition, the receptor is exposed to air, soil, and surface water pathways resulting in radiological risk of 3 x 10-5. The total radiological risk to the trespassing child is 5 x 10-3 (external radiation) plus 3 x 10-5 (nuclide-specific radiation) totalling 5 x 10-3. The receptor with the greatest total chemical risks (1 x 10-4) is the off-property resident farmer (Table 6-6). The greatest contribution under this scenario is from exposure to air pathways (1 x 10-4). The receptor with the greatest total radiological plus chemical risk under this scenario (5 x 10-3, Table 6-6) is the trespassing child. The greatest HI is 0.3 to the trespassing child (Table 6-7). The greatest contribution, under this scenario is from soil exposure pathways (0.2).

TABLE 6-6
INCREMENTAL LIFETIME CANCER RISK SUMMARY ALL SOURCES/ALL PATHWAYS

Land Use/ Source Term Scenario	Type of Risk	Grounds Trespassing Child	Off-Property Keeper	Off-Property User of Surface Resident Farmer	CT On-Property Water	RME On-Property Resident Farmer	On-Property Resident Farmera	Resident Child
Current Land Use without Access Control/Current Source Term Scenario	Radiological-Nuclide Specificb	3.0 x 10-5	8.0 x 10-5	1.0 x 10-5	1.0 x 10-7	NAc	NA	NA
	Radiological-Externala	5 x 10-3	1 x 10-4	NA	NA	NA	NA	NA
	Chemical Risk	1.0 x 10-5	2.0 x 10-5	1.0 x 10-4	1.0 x 10-7	NA	NA	NA
	Total Risk	5.0 x 10-3	2.0 x 10-4	1.0 x 10-4	2.0 x 10-7	NA	NA	NA
Current Land Use without Access Control/Future Scenario	Radiological-Nuclide Specific	1.0 x 10-2	3.0 x 10-2	2.0 x 10-3	1.0 x 10-6	NA	NA	NA
	Chemical Risk	4.0 x 10-4	6.0 x 10-4	2.0 x 10-4	7.0 x 10-7	NA	NA	NA
	Total Risk	1.0 x 10-2	3.0 x 10-2	2.0 x 10-3	2.0 x 10-7	NA	NA	NA
Current Land Use with Access Control/Current Source Term Scenario	Radiological-Nuclide Specific	3.0 x 10-5	NA	1.0 x 10-5	1.0 x 10-7	NA	NA	NA
	Radiological-External	5.0 x 10-3	NA	NA	NA	NA	NA	NA
	Chemical Risk	1.0 x 10-5	NA	1.0 x 10-4	1.0 x 10-7	NA	NA	NA
	Total Risk	5.0 x 10-3	NA	1.0 x 10-4	2.0 x 10-7	NA	NA	NA
Future Land Use/Current Source Term Scenario	Radiological-Nuclide Specific	NA	NA	1.0 x 10-5	1.0 x 10-7	2.0 x10-4	3.0 x 10-3	3.0 x 104
	Radiological-External	NA	NA	NA	NA	2.0 x10-4	2.0 x 10-3	9.0 x10-3
	Chemical Risk	NA	NA	1.0 x 10-4	1.0 x 10-7	5.0 x 10-3	8.0 x 10-2	5.0 x10-2
	Total Risk	NA	NA	1.0 x 10-4	2.0 x 10-7	5.0 x 10-3	9.0 x 10-2	6.0 x10-2
Future Land Use Future Source Term Scenario	Radiological-Nuclide Specific NA	NA	NA	2.0 x 10-3	1.0 x 10-6	1.0 x10-1	1.0 x 100	1.0 x10-1
	Chemical Risk	NA	NA	2.0 x 10-4	7.0 x 10-7	1.0x 10-2	2.0 x 10-1	9.0 x10-2
	Total Risk	NA	NA	2.0 x 10-3	2.0 x 10-4	1.0 x 10-1	>1.0	2.0 x 10-1

a The ILCR values were identical for the future land use/future source term scenario evaluated for either the Great Miami Aquifer or for perched water.

b The ILCR result from exposure to radionuclides from air, water, (ground and surface), soil and sediment as detailed in Attachment II of Appendix D and summarized in tables within Section D.5.

c NA signifies not applicable.

d This risk results from exposure to direct external radiation from large sources (Silos 1, 2, and 3) and are presented in Table D 5-2. It does not include exposure to external radiation emanating from radionuclides in surface soils. These later risk are accounted for in the nuclide-specific ILCR.

TABLE 6-7
HAZARD INDEX SUMMARY ALL SOURCES/ALL PATHWAYS

Land Use/ Source Term Scenario	Type of Risk	Off-Property Trespassing Child	Off-Property Grounds Keeper	Resident Farmer	User of Surface Water	CT On-Property Resident Farmer	RME On-Property Resident Farmer[a]	ON-Property Resident Child
Current Land Use without Access Control/Current Source Term Scenario	Chemical Hazard Index	0.3	0.1	0.05	0.0004	NA[b]	NA	NA
Current Land Use without Access Control/Current Source Term Scenario	Chemical Hazard Index	20	20	5	0.002	NA	NA	NA
Current Land Use with Access Control/Current Source Term Scenario	Chemical Hazard Index	0.3	NA	0.05	0.0004	NA	NA	NA
Future Land Use/Current Source Term Scenario	Chemical Hazard Index	NA	NA	0.05	0.0004	8	20	100
Future Land Use/Current Source Term Scenario	Chemical Hazard Index	NA	NA	5	0.002	300	500	2000

a The HI (500) was identical for the future land use/future source-term scenario.
b NA signifies not applicable.

6.1.4.2 Current Land Use Without Accesss Control/Future Source-Term Scenario

The receptor with the greatest total radiological risk is the groundskeeper (Table 6-6). The greatest contribution under this scenario is from exposure to soil pathways (2 x 10 2). The total radiological risk to the groundskeeper under this scenario is 3 x 10-2 (Table 6-6). The receptor with the greatest total chemical risk is also the groundskeeper (Table 6-6). The greatest contribution is from exposure to soil pathways (5 x 10-4). The total chemical risk to the groundskeeper under this scenario is 6 x 10-4. The total radiological plus chemical risk to the groundskeeper under this scenario is 3 x 102 Table 6-6). The greatest HI is 20 to the groundskeeper (Table 6-7) and to the trespassing child (Table 6-6). The greatest contribution to both receptors under this scenario is from exposure to air pathways.

6.1.4.3 Current Land Use With Access Control/Current Source-Term Scenario

This scenario most closely approximates current conditions at the FEMP site. However, the risk and HI results for this scenario are numerically the same as the results for the current land-use scenario without access controls assuming the current source term (Section 6.1.4.1). This is because the presence or absence of access controls does not change the numerical values of exposure parameter values for receptors. The trespassing child's exposure parameter values reflect the standard scenario specified by the EPA. Also, the off-property resident farmer, and surface water user exposures are not impacted by the status of access controls.

6.1.4.4 Future Land Use/Current Source-Term Scenario

The receptor with the greatest total radiological risk is the on-property resident child (Table 6-6). The greatest contribution under this scenario is from exposure to external radiation while the receptor is on top of the Silo 1 or 2 dome (9 x 10-3). In addition, the receptor is exposed to air, soil, and surface water pathways resulting in a radiological risk of 3 x 10-4, primarily from the soil pathway (2 x 10-4). The total radiological risk to the on-property resident child is 9 x 10-3 plus 3 x 10-4 totaling 9 x 10-3. The receptor with the greatest total chemical risk (8 x 10-2) is the RME on-property resident farmer able 6-6). The greatest contribution under this scenario is from exposure to soil pathways (8 x 10-2). The receptor with the greatest total radiological plus chemical risk under this scenario (9 x 10-2, Table 6-6) is the RME on property resident farmer. The greatest HI is 100 to the on-property resident child (Table 6-7). The greatest contribution to chemical hazard under this scenario is from soil exposure pathways (100).

6.1.4.5 Future Land Use/Future Source-Term Scenario,

This represents the most conservative scenario considered under the baseline risk assessment. Within this scenario, a family is assumed to have established a residence within the Operable Unit 4 boundaries. Additionally, the domes of Silos 1 and 2 are assumed to have failed and Silo 3 is assumed to have suffered total structural failure, spreading its cons to the surface of Operable Unit 4. As described in Section D.3 of the R1 Report for Operable Unit 4, the failure of Silo 3 and the assumed distribution of its contents on the surrounding surface makes it more appropriate to evaluate direct external exposure in a nuclide- specific manner rather than as a large source. With the failure of the domes of Silos 1 and 2 it is no longer appropriate to evaluate direct external radiation exposure at these locations. Therefore, the separate entry in Table 6 for external radiation does not appear for the future source-term scenario.

The receptor with the greatest total radiological risk is the RME on-property resident farmer (Table 6-6). The greatest contribution under this scenario is from exposure to soil pathways (approaching unity risk). The total radiological risk to the RME on-property resident farmer under this scenario also approaches unity (1) risk. The receptor with the greatest total chemical risk is also the RME on-property resident farmer (Table 6-6). The greatest contribution is from exposure to soil pathways (2 x 10-1). The total chemical risk to the RME on-property resident farmer under this scenario is 2 x 10-1. The total radiological plus chemical risk to the RME on-property radiant farmer under this scenario exceeds unity (Table 6-6). The greatest HI is 2000 to the on-property resident child (Table 6-7). The greatest contribution to this receptor under this scenario is from exposure to soil pathways.

6.1.5 Risk Assessment Uncertainties

The uncertainties in the risk assessment process are presented in detail in Section D.6.0 of Appendix D of the RI Report for Operable Unit 4. These uncertainties are summarized below to enable a better understanding of their impacts on the foregoing risk assessment.

Uncertainty is a factor in each step of the exposure and toxicicy assessment process. Such uncertainty can involve variations in sample analytical results, the values of variables used as input to a given model, the accuracy with which the model itself represents actual environmental or biological processes, the manner in which the exposure scenario is developed, and the high-to-low dose and interspecies extrapolations for dose-response relationships.

Generally, risk assessments carry two types of uncertainty. First, measurement uncertainty refers to the usual variance that accompanies scientific measurements (such as the range of an exposure estimate) and reflects the accumulated variances of the individual measured values used to develop the estimate. The second form of uncertainty is due to the absence of information needed to complete the database for thc assessment. In some instances, the impact is significant, such as the absence of information on the adverse effects or the biological mechanism of action of a chemical agent.

6.1.5.1 Sources of Uncertainty

As noted previously, uncertainties are associated with the information and data used in each phase of the Operable Unit 4 baseline risk assessment. The first source of uncertainty arises from data gaps or limiious in the data. For example, the data sa for soil is limited, and virtually nothing is known regarding contaminants in the area of the former Drum-Handling Building. These limitations could result in failure to identify some COCs which may result in underestimating risk. (This data limitation and its epected impact on the baseline risk assessment is further discussed in greater detail in Section 7.5 of the RI Report for Operable Unit 4).

Other sources of uncertainty include the conservative bias of parameters, parameter variability (random errors or natural variations), and the necessity of using computer models to predict complex environmental interactions. Uncertainties also arise from the use of animal data to predict the toxic effects and the toxic potency in humans. Uncertainties associated with information and data are evaluated below to provide the spectrum of information in regard to the overall quality of the risk assessment results. The uncertainties are associated with exposure route selection, selection of COCs, exposure point concentrations, and exposure factors.

6.1.5.2 Toxicity Assessment

Considerable uncertainty is associated with the qualitative hazard assessment) and quantitative (dose-response) evaluations of a Superfund risk assessment. A hazard assessment deals with characterizing the nature and strength of the evidence of causation, or the likelihood that a chemical that induces adverse effects in animals will induce adverse effects in humans. Hazard assessment of carcinogenicity is evaluated as a weight-of-evidence determination, using either the International Agency for Research on Cancer (IARC) (1987) or EPA (1986) schemes. Positive cancer test data in experimental animals suggest that a human exposed to the same agent may suffer adverse effects. However, animal data, may not accurately predict the same response or the same target organ tissue for cancer in humans. Also, biochemical repair mechanisms present in humans may inhibit or preclude an identical response. Accordingly the uncertainty of possible effects is significant. In assessing noncancer effects, however, positive experimental animal data from well designed studies in appropriate models suggest to the target tissues and type of effects that may be anticipated in humans (EPA 1989a).

6.2 OVERVIEW OF THE BASELINE ECOLOGICAL RISK ASSESSMENT

The purpose of the ecological risk assessment, which was completed as a companion to the preliminary site-wide baseline risk assessment in the Site-Wide Characterization Report (SWCR), was to estimate the potential and future baseline risks of FEMP contaminants to ecological receptors.

The EPA and DOE have agreed in the Amended Consent Agreement (September 1991) that the Site-Wide Ecological Risk Assessment will be performed as part of the RI for Operable Unit 5. The Site-Wide Ecological Risk Assessment in the RI for Operable Unit 5 will quantify and assess the possible risks from current concentrations of site contaminants to ecological receptors inhabiting on-property and off-site areas not presently targeted for remediation based on human-health concerns. More discussion on the Risk Assessment and Ecological Risk issues specific to Operable Unit 4 can be found in the Operable Unit 4 Proposed Plan.

The ecological receptors potentially exposed to FEMP contaminants include all organisms, exclusive of humans and domestic animals. The ecological risk focused on a group of indicator species selected to represent a variety of exposure pathways and trophic positions. Terrestrial vegetation was represented by a generic plant species. Terrestrial wildlife species to be evaluated were selected based on species abundance on the FEMP site, trophic level position, and habitat requirements. The species evaluated were the white-tailed deer (Odocoileus virginianus), white-footed mouse (Peromyscus leucopus), raccoon (Procyon lotor), red fox (Vulpes fulva), muskrat (Ondatra zibethica), American robin (Turdus migratorius), and red-tailed hawk (Buesto jamaicensis).

The assessment examined risks to terrestrial organisms associated with contaminants in two environmental media - surface soils, summarized for the entire site, and surface water in Paddys Run from the northern boundary of the FEMP site to the confluence with the storm sewer outfall ditch. Risks to aquatic organisms were evaluated for exposure to contaminants in Paddys Run, the Great Miami River, and in runoff into the storm sewer outfall ditch. All nonradioactive and radioactive constituents of greatest human health risk were considered to be of concern for the ecological risk assessment. Estimated ecological risks associated with exposure to FEMP site COCs are primarily due to nonradioactive inorganic chemicals in soils, rather than to organic chemicals or radionuclides. This is true for both terrestrial and aquatic organisms and for plants as well as wildlife. In particular, estimated intakes of arsenic, cobalt, lead, and silver from FEMP soils were all higher than the estimated No Observed Effect Levels (NOELs) for at least six of the seven indicator species selected for this assessment. The relative hazards to individual species varied, but the white-footed mouse consistently had the highest indices of these chemicals. This can be attributed to the assumed intake by the mouse of insects (using earthworms as surrogates), which in turn were assumed to assimilate chemicals from soil with a transfer coefficient of 1.0.

Estimated hazards to terrestrial organisms of exposure to COCs in FEMP surface waters were relatively low, with HIs greater than one only for arsenic, lead, molybdenum, and silver. These chemicals presented hazards of two, five, four and three to species, respectively, and the highest HI estimated was for lead intake by the mouse.

Estimated doses to terrestrial organisms at the FEMP site, originating from soil uptake by plants and earthworms, were below levels expected to cause detectable effects. However, as with inorganic chemicals, this conclusion is sensitive to assumptions about muscle-to-muscle transfer of radionuclides. If perfect transfer or biomagnification of uranium occurs (i.e., transfer factor equals 1.0), it could expose terrestrial wildlife at the FEMP to potentially harmful radiation levels. However, if more realistic muscle-to-muscle transfer coefficient were assumed (i.e., 0.1), the estimated radiation doses would fiell below the range likely to result in harmful effects. Radiation doses due to water intake were insignificant.

Exposure to radiological contaminants does not appear to pose a significant risk to aquatic organisms at the measured concentrations in the surface waters and sediments impacted by the FEMP site. However, modeled concentrations of radionuclides in runoff from the FEMP site into surface water would cause estimated exposures to exceed the upper limit of 1 rad/day. A chronic dose rate of 1 rad/day or 3.65 x 10-5 mrad/year or less to the maximally exposed member of a population of aquatic organs would ensure that there were no deleterious effects from radiation on the population. The most affected organisms would be aquatic planes, receiving a total dose from internal and external exposure of about 140 rad/day. The total dose to fish is minimally over the limit, ae 1.6 rad/day, and the total dose to benthic macroinvertebrates is about 14 rad/day. The maximum concentrations calculated in the storm sewer outfall ditch was used in source runoff calculations. Doses to aquatic organisms in the storm sewer outfall ditch may exceed the limit of 1 rad/day. Doses in Paddys Run and the Great Miami River would be lower than that indicated in the storm sewer outfall ditch and would be well below 1 rad/day. The measured concentrations of cadmium in Paddys Run and the Great Miami River, copper in the Great Miami River, mercury in Paddys Run, the Great Miami River, and the storm sewer outfall ditch, and silver in Paddys Run water exceeded chronic toxicity criteria for the protection of freshwater organisms.

Field studies on the impact of the FEMP site on terrestrial and aquatic communities do not indicate any effects consistent with contaminant impacts except for above-background levels of arsenic and mercury recorded in RI/FS plant samples. In addition, although potential impacts at the individual level were predicted for wildlife species, detrimental or adverse impacts have not been observed in the field. This suggests that the potential exposures predicted by modeling may not occur in the field or that the resulting potential effects as a result of exposures may not occur. A comparison of the concentrations of inorganic chemical concentrations in FEMP soils to regional background values indicate the mean FEMP concentrations may be similar to the upper 95 percent confidence levels of background values. This indication suggests that ecological risks estimated using background values of inorganics would be comparable to those estimated for the FEMP site, and emphasizes the conservative nature of the method used.

In summary, although radionuclides are the most ubiquitous contaminants at the FEMP, estimated ecological risks to both terrestrial and aquatic organisms are primarily associated with nonradioactive inorganic chemicals. Although estimated risks are substantial in some instances, they are based on soil inorganic chemical concentrations comparable to background levels, and deleterious effects have not been observed in the field. This suggests that current FEMP site-specific ecological risks are low. However, remedial actions are appropriate to address contaminants which have potential to cause harm in the future.

7.0 DESCRIPTION OF REMEDIAL ALTERNATIVES

As previously discussed in Section 5.0, the waste materials within Operable Unit 4 exhibit a wide range of properties. Most notable would be the elevated direct radiation associated with the moist to wet Silos 1 and 2 residues versus the much lower direct radiation associated with the dry, powdery cold metal oxides in Silo 3. Even more significant would be the much lower levels of contamination associated with the soils and building materials, like concrete, within the Operable Unit 4 Study Area. To account for these differences and for the varied cleanup alternatives applying to each type of waste, Operable Unit 4 was segmented into three subunits. These subunits, which are listed below, were used through the detailed evaluation of alternatives and the identification of the preferred alternative.

Subunit A: Silos 1 and 2 (K-65 residues and bentonite clay) and the sludge in the decant sump tank

Subunit B: Silo 3 (cold metal oxides)

Subunit C: Silos 1, 2, 3, and 4 structures; contaminated soils within the Operable Unit 4 boundary including surface and subsurface soils and the earthen berm around Silos 1 and 2; the decant sump tank; the radon treatment system; the concrete pipe trench and the miscellaneous concrete structures within operable Unit 4, any debris (i.e., concrete, piping, etc.,) generated through implementing cleanup for Subunits A and B, and any perched groundwater encountered during remedial activities.

With the exception of Alternatives 2A/Vit and 2A/Cem (see Section 11 for details) the remedial alternatives, which went through detailed analysis during the FS for operable Unit 4, are summarized below. The discussions presented here are based on the information used for detailed analysis of alternatives during the FS. Actual methods used during the implementation of the selected alternative(s) will be determined during detail engineering design described in the remedial design and may differ from the descriptions provided below.

Section 121 of CERCLA requires that remedial actions be protective of human health and the environment, and a level or standard of control that is consistent with federal or state enviromnental laws or state facility siting regulations, which are termed applicable or relevant and appropriate requirements (ARARs). ARARs pertain to all aspects of a remedial action, including the establishment of cleanup levels, the operation and performance of treatment systems, and the design of disposal facilities.

The baseline risk assessment performed as part of the RI Report for Operable Unit 4, quantified the health risks to hypothetical human receptors due to exposure from chemical and radiological sources in Operable Unit 4 under the no-action alternative. A summary of the risk assessment and results is presented in Section 6.0. Essentially, the results emphasize the need to effectively complete the selected remedial actions at Operable Unit 4 in order to ensure overall protection of human health and the environment.

Potential remedial alternatives were developed and evaluated in the FS Report for Operable Unit 4 as to how these risks would be eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls. Both long-term and short-term risks associated with implementing an alternative were considered in determining whether a given alternative was protective. Each alternative evaluated provides a description of its overall effectiveness in reducing risks to human health and the environment.

ARARs consist of two sets of requirements, those that are applicable and those that are relevant and appropriate. Applicable requirements are those substantive standards that specifically address a situation at a CERCLA site. Relevant and appropriate requirements are standards that address problems sufficiently similar to the situation at a CERCLA site that their use is well suited to the site. In certain cases, standards may not exist in the promulgated regulation that address the proposed action or the constituents of concern. In these cases, non-promulgated advisories, criteria, or guidance that were developed by the EPA, other federal agencies, or states are to be considered (TBC) in establishing remedial action objectives that are protective of human health and the environment.

A detailed discussion of all ARARs and TBC criteria associated with the remedial alternatives being evaluated for Operable Unit 4 is presented in Appendix F of the FS Report for Operable Unit 4. From these detailed lists, certain major ARARs and TBCs were selected based on their importance in protecting human health and the environment. These include those associated with the protection of drinking water sources, the control of radionuclide emissions, the design and siting of a solid waste disposal facility, the management of RCRA hazardous waste, and compliance with NEPA. The major ARARs associated with the remedial alternatives evaluated in this section, with the exception of the no action alternatives, are presented in Appendix A of this ROD. These major ARARs are segregated into three types:

(a) Chemical-specific ARARs sre usually health- or risk-derived numerical values or methodologies that establish an acceptable level or concentration of chemical or radionuclide that may remain in specific environmental media after remediation is complete. These levels are deemed to be protective of human health and are used to help establish remedial cleanup goals.

(b) Location specific ARARs generally restrict certain activities or dictate where certain activities may bc conducted, solely because of geographical, hydrologic, hydrogeologic, or land use concerns.

(c) Action-specific ARARs are usually technology or activity based requirements or restrictions on the conduct of certain activities or the operation of certain technologies at the site.

Appendix A identifies all remedial alternatives evaluated along with their major regulatory requirements, the rationale for designation of each regulatory requirement as an ARAR/TBC, and the mechanism by which the remedial alternative will comply with the requirement.

7.1 NO-ACTION ALTERNATIVE FOR ALL SUBUNITS

The No-Action Alternative for Subunits A, B, and C is presented to provide a baseline for comparison with the other alternatives per the President's Council on Enviromnental Quality and 40 CFR Part 300, the Nation Oil and Hazardous Substances Pollution Contingency Plan regulations. Under the No-Action Alternatives, desiged as 0A, 0B, and 0C for each of the three subunits, the contaminated and/or uncontaminated materials within each subunit would remain unchanged without any further waste removal, treatment, or containment activities.

Alternatives 0A, 0B, and 0C do not provide for the monitoring of soil, groundwater, or radon emissions from the Operable Unit 4 facilities or soils, and do not provide for access controls (e.g., physical barriers and deed) to reduce the potential for exposure to any human or ecological receptors. The No-Action Alternatives would not decrease the toxicity, mobility, or volume of contaminants or reduce public health or environmental risks. Also, goals for protecting the underlying groundwater aquifer would not be met. No costs are associated with the No-Action Alternative.

ARAR Compliance for No-Action Alternatives

Alternatives 0A, 0B, ad 0C would not comply with a number of chemical-specific, location specific, or action-specific ARARs. Under the no-action alternatives, Silos 1, 2, and 3 would eventually fail, resulting in the release of silo contents to the air, soil, groundwater, and surface water. Fate and transport modeling indicates that uranium and gross alpha and beta radiation would exceed safe drinking water limits under 40 CFR §141. In addition, localized "hot spots" could exceed the limits established in 40 CFR §192.12.

7.2 SUBUNIT A - CONTENTS OF SILOS 1 AND 2 AND THE DECANT SUMP TANK

With the exception of Alternatives 2A/Vit and 2A/Cem (see Section 11 for details) this session presents the alternatives which were evaluated for Subunit A during the detailed analysis of alternatives phase of the FS for Operable Unlt 4. These alternatives focus on the remediation of the K-65 residues contained in Silos 1 and 2 and the sludges in the decant sump tank.

All of the alternatives would provide overall protection of human health (assuming continued federal government control) and the envnent by eliminating, reducing, or controlling risk through treatment, engineering controls, or institutional controls. The selected remedy (3A.1/Vit) would provide greater certainty for overall protection than other alternatives because the Subunit A residues would be vitrified and removed to the NTS to reduce the potential for contaminant migration to human and ecological receptors. The source of unacceptable risks to the Operable Unit 4 expanded trespasser and off-site farmer would be eliminated, and in the event that the government lost control of the FEMP site, there would be no risk from Subunit A residues to an on-property farmer.

Overall protection at the NTS would be maintained because the vitrified residues resist leaching and the NTS is located in a climatic, demographic, and hydrogeologic setting which favors minimization of containment migration to both human and environmental receptors.

7.2.1 Alternative 3A.1/Vit - Removal, Vitrification, and Off-Site Disposal - Nevada Test Site

Capital Cost: $38.3 Million (M)

O&M Costs:

During Remediation: $11.7 M

Post-Remediation: $0

Present Worth: $43.7 M

Years to Implement: 6

This alternative involves the removal, vitrification, and off-site disposal of the treated Silos 1 and 2 contents and decant sump tank sludge. Treated material would be transported by rail, then truck, to the NTS, a DOE-owned facility that currently accepts low-level radioactive material from DOE Facilities for disposal. Under Alternative 3A.1/Vit, approximately 6,796 m3 (8,890 yd3) of untreated residues would be removed from Silos 1 and 2 and combined with approximately 3,785 Liters (L) (1,000 gallons) of sludge from the decant sump tank and treated. Approximately 2,770 m3 (3,623 yd3) of vitrified material would be packaged in containers and transported to the NTS for disposal. Disposal of contaminated materials from the berms, Silos 1 and 2 structures, the material removal equipment, and the vitrification system would be managed under the selected alternative for Subunit C. No five-year CERCLA reviews would be required under is alternative since no Subunit A residue material would remain at the FEMP. The components of this alternative not previously described are as follows.

Material Removal

Silos 1 and 2 residues and decant sump tank sludge would be slurried and pumped to the vitrification plant for processing. During the material removal phase, Silos 1 and 2 and the decant sump tank would be equipped with an off gas handling system to treat radon and other potential airborne contaminants. This off-gas handling system would be operational during material removal and before personnel enter the area above the silo domes to reposition material removal equipment and conduct repairs or maintenance. The off-gas handling system and operating procedures would be designed as necessary to minimize exposure to personnel located overa the work areas and to prevent the escape of radon and radioactive particulates from the silos and the decant sump tank to the atmosphere.

Material Stabilization

Silos 1 and 2 residues and decant sump tank sludge would be combined with glass forming agents, processed in a high temperature furnace, and converted into a stable vitrified glass form exhibiting excellent durability and constituent leaching characteristics. It should be noted that current planning focuses upon pouring the molten glass directly into containers capable of withstanding the high temperature of the vitrified waste form. The final waste form would continue to be optimized in pilot plant treatability studies and final decision regarding the final waste form would be reached during the pilot plant treatability studies. Process tanks/vessels and piping containing slurried K-65 residues would be designed to minimize potential radon and particulate emissions to the atmosphere during treatment. The direct radiation associated with the treated residues would remain relatively unchanged from the untreated form of the K-65 residues.

Interim Storage

The containerized vitrified product will require interim storage at the FEMP prior to its transportation to the NTS for disposal. The purpose of this interim storage is two-fold; first, the vitrified product will require verification sampling in order to certify that each production lot has met specific performance and waste disposal criteria; and second, to provide the Fernald waste shipping program a buffer staging area where the material can be safely managed prior to its shipment to NTS in accordance with DOE ALARA principles, ARARs identified and included in the Operable Unit 4 ROD, as well as in a manner protective of human health and the environment. It has been anticipated that the interim storage area will be needed to accommodate the interim handling of approximaly 90 days of vitrification production.

Disposal of Treated Material

Off-site disposal for this alternative involves the packaging, loading, and shipping of the treated material, in accordance with all required United States Department of Traosportation (DOT) specification regulations, to the low-level radioactive waste disposal site at the NTS, a DOE-owned facility that currently accepts low level radioactive material from DOE facilities for disposal. Shipment of the treated material to the NTS would be performed by rail and/or truck transportation from the FEMP site. Currently, there are no direct rail lines into the NTS. The treated material would be transported by rail to either a point near Las Vegas, Nevada, or one of the areas north of Las Vegas. From either location, the containers carrying the treated material would be transferred to trucks for transportation over roads to the NTS.

The NTS is located approximately 3,219 kilometers (km) [2,000 miles (mi)] from the FEMP site. Because the vitrified residues resist leaching and the NTS is located in a sparsely populated, arid region, where depths to groundwater are at least 235 m (771 ft) below the surface, disposal at the NTS would be very effective at precluding human contact with and contaminant migration from the treated residues from Subunit A. The FEMP site has an approved NTS waste shipment and certification program that is periodically audited by the NTS. Efforts have been initiated to amend the current program to include Operable Unit 4 treated material. All the NTS waste acceptance requirements would need to be satisfied prior to any shipment of the Operable Unit 4 treated material to the NTS.

Implementation Time and Costs

Remedial action activities under Alternative 3A.1/Vit could be completed in approximately six years. Approximely three years is projected for completion of site preparation, facilities construction, and equipment installation. Material removal and treatment activities would require about three years.

Transportation and off-site disposal would conclude shortly after the completion of material processing. Capital costs for Alternative 3A.1/Vit are estimated to be 38.3 million dollars. O&M costs during remediation are estimated at 11.7 million dollars over three years. Due to the off-site disposal option, there are no post-remediation O&M costs associated with this alternative. The total present worth cost for this alternative is estimated at 43.7 million dollars.

7.2.2 Alternative 3A.1/Cem - Removal, Cement Stabilization, and Off-Site Disposal - NTS

Capital Cost: $71.8 M

O&M Costs:

During Remediation: $11.7 M

Post-Remediation $0

Present Worth: $73.1 M

Years to Implement: 6

This alternative is identical to Alternative 3A.1/Vit accept that the vitrification of the Silos 1 and 2 contents and decant sump tank sludge have been replaced by cement stabilization. Treated material and debris would be transported by rail, then truck to the NTS: Under Alternative 3A.1/Cem, approximately 6,796 m3 (8,890 yd3) of untreated materials would be removed from Silos 1 and 2, combined with approximately 3,785 L (1,000 gallons) of sludge ffom the decant sump tank, and treated. Approximately 18,166 m3 (23,760 yd3) of cement stabilized product would be packaged in containers and transported to NTS for disposal. Disposal of contaminated materials from the berms, Silos 1 and 2 structures, the material removal equipment, and the cement stabilization system would be managed under the selected alternative for Subunit C. No five year CERCLA reviews would be required since all Subunit A materials would be removed from the site. The components of this alternative not previously described under alternative 3A.1/Vit are as follows.

Material Stabilization

Silos 1 and 2 residues and the decant sump tank sludge would be combined with cement and other additives necessary for stabilizing the materials into a cement form. Similar to Alternative 3A.1/Vit, process tanks/vessels and piping containing slurried K-65 residues would be designed to minimize potential radon and radionuclide particulate emissions to the atmosphere during treatment. Studies conducted on a small scale in a laboratory, as part of the Operable Unit 4 RI/FS, indicate that an estimated 150 percent increase can be expected in the volume of waste requiring disposal following stabilization. This increase is a result of the large volume of additives needed to effectively stabilize the silo residues and decant sump tank sludge in cement. These studies have also concluded that the cement stabilization of the wastes does not effectively reduce the radon emission rate from the waste and the tendency of the waste to leach contaminants into groundwater. The direct radiation associated with the untreated residues would be slightly reduced due to the effects of mixing the additives with the residues. The solidified materials would be packaged in containers for disposal.

Implementation Time and Costs

Remedial action activities under Alternative 3A.1/Cem could be completed in about six years. Approximately three years are projected for completion of site preparation, facilities construction, and equipment installation. Material removal and treatment activities would require about three years. Transportation and off-site disposal would conclude shortly after the completion of material processing. Capital costs for Alternative 3A.1/Cem are estimated to be 71.8 million dollars. O&M costs during remediation are estimated at 11.7 million dollars over three years. Due to the off-site disposal option, there are no post-remediation O&M oosts associated with this alternative. The total present worth cost of this alternative is estimated at 73.1 million dollars.

7.3 SUBUNIT B - CONTENTS OF SILO 3

This section presents the alternatives which were evaluated for Subunit B during the detailed analysis of alternatives phase of the Operable Unit 4 FS. These alternatives focus on the remediation of the cold metal oxides contained in Silo 3.

As discussed in Section 6, this evaluation assumes that the federal government would continue to own the FEMP site. For a cleanup remedy to be considered protective, it should not result in any unacceptable risks to an Operable Unit 4 expanded trespasser or an off-site farmer.

All alternatives would provide overall protection of human health and the environment. These alternatives will eliminate, reduce, or control the health or environmental risks resulting from constituents in Subunit B materials. All of the action alternatives, except Alternative 4B, would limit exposure to contaminants by removing the material, treating the material by either vitrification or cement stabilization, and then disposing the treated naterial in an on-property above-grade disposal vault (Alternative 2B) or off site at NTS (Alternative 3B.1). Alternative 4B's protection is based on removal and disposal in an on-property above-grade vault, and by retaining institutional controls. Long-term effectiveness would be attained for each of these alternatives.

In summary, the preferred alternative (3B.1/Vit) would provide for overall protection because the Subunit B residues would be vitrified and removed to the NTS to reduce the potential for contaminant migration to human and ecological receptors.

7.3.1 Alternative 2B/Vit - Removal, Vitrification, and On-Property Disposal

Capital Cost: $25.2 M

O&M Costs:

During Remediation: $4.9 M

Post-Remediation: $3.2 M

Present Worth: $28.0 M

Years to Implement: 4

This alternative requires the removal, vitrification, and on-property disposal of the Silo 3 contents. Under Alternative 2B/Vit,approximatelyy 3,890 m3 (5,088 yd3) of untreated materials would be removed from Silo 3 and stabilized in a vitrified glass form. Following treatment, approximately 1,471 m3 (1,924 yd3) of vitrified material would be packaged in containers and placed in an on-property above-grade reinforced concrete disposal vault. The Silo 3 structural materials, associated soils, the material removal system and the vitrification system would be managed under the selected alternative for Subunit C. In accordance with CERCLA 121(c) requirements, after commencement of remedial activities, a review would be performed every five years by the EPA to ensure the continued protection of human health and the environment.

Material Removal

Due to the powder-like chances of Silo 3 cold metal oxide residues, Alternative 2B/Vit would utilize a pneumatic removal process to transport Silo 3 contents to the material processing facility. The pneumatic removal system consists of a compressed air driven pump that displaces and removes the dry wastes. Air entrained in the cold meter oxides, suctioned from Silo 3, would be separated using filter/receiver systems allowing the cold metal oxides to be pneumatically "pushed" to the vitrification facility. A glove box system will be used at the interface of the pneumatic removal system and the silo dome to function as secondary containment. This arrangement, along with appropriate operations procedures, would be designed to prevent releases to the atmosphere during operations.

Material Stabilization

The vitrification process is identical to that described in Section 7.2.1 for Alternative 3A.1/Vit. Bench-scale studies conducted in a laboratory as part of the RI/FS for Operable Unit 4 indicate that vitrification can effectively reduce the tendency of the Silo 3 residues to leach inorganics and radionuclides to groundwater. This testing also demonstrated that over a 50 percent reduction in the volume of material requiring disposal could be achieved through the application of vitrification technology to the Silo 3 residues. The vitrified residues would be packaged in containers for disposal.

Disposal of Treated Material

Studies completed on a bench scale as part of the RI/FS project that the volume of material requiring disposal can be reduced by over 50 percent as a result of applying the vitrification process. The vitrified material would be containerized and disposed in an above-grade reinforced concrete disposal vault located on property. The vault would be constructed on a reinforced concrete mat and equipped with a leachate collection/detection system to facilitate the collection of any contaminated leachate after final closure. The capping system would be composed of alternating composite soil liners and drainage layers to minimize the potential release of contaminated leachate to the underlying Great Miami Aquifer. The proposed disposal facility would be located at a suitable location of the FEMP site.

Final closure would be completed by the construction of a multimedia cap over the vault. This cap would include a clay cover to eliminate radon emanation from the disposed materials to the atmosphere and a barrier to preclude intrusion by burrowing animals and hypothetical future residents of the area. Upon completion of the multimedia cap, security controls such as fencing would be installed. Monitoring wells would be appropriately located to evaluate the effectiveness of the above-grade disposal vault in ensuring long-term protection of human health and the environment.

To provide added assurance against any future activities by humans to intrude into the disposal vault, permanent markers would be installed to identify the vault, and restrictions would be placed on the site. Additionally, in order to ensure long-term protectiveness for this alternative, it is assumed that the effected disposal areas at the FEMP would require the continued ownership by the federal government. While the disposal vault would be designed to not require any continued active operations or maintenance, long-term ownership would permit the govermnent to continue to exercise the right to preclude any development or drilling in areas where contaminated materials are disposed.

All facilities and equipment installed and used by this alternative would be disassembled and decontaminated during the post-remediation phase. Contaminated materials would be disposed in accordance with the selected remedy for Subunit C.

Implementation Time and Costs

Remedial action activities under Alternative 2B/Vit could be completed in about four years. Site preparation and construction activities would take approximely three years. Removal and material processing activities would require about one year. Capital costs for Alternative 2B/Vit are estimated to be 25.2 million dollars. O&M costs during remediation are estimated at 4.9 million dollars over one year, while post-remediation O&M costs are estimated at 3.2 million dollars over a thirty year period. The total present worth cost for this alternative is estimated at 28.0 million dollars.

7.3.2 Alternative 2B/Cem - Removal, Cement Stabilization, and On-Property Disposal

Capital Cost: $35.9 M

O&M Costs:

During Remediation: $4.9 M

Post-Remediation: $3.2 M

Present Worth: $37.4 M

Years to Implement: 4

This alternative uses the material removal methodology presented in Alternative 2B/Vit, followed by treatment of the Silo 3 contents by cement stabilization and on property disposal of the stabilized material. Under Alterntive 2B/Cem, appoximately 3,890 m3 (5,088 yd3) of untreated materials would be removed from Silo 3 and stabilized in a cement form. Approximately 5,999 m3 (7,846 yd3) of stabilized material would be packaged in contains and placed in an on-property above-grade reinforced concrete disposal vault. The Silo 3 structural materials, the material removal system, and the cement stabilization system and associated soils would be remediatet with the selected alternative for Subunit C. In accordance with CERCLA 121(c) requirements, after commencement of remedial activities, a review would be performed every five years by the EPA to ensure the continued protection of human health and the environment. The components of this alternative not previously discussed are as follows.

Material Stabilization

The cement stabilization process is identical to that described in Section 7.2.2 for Alternative 3A.1/Cem with the exception of differences in the cement formulations required to accommodate physical and chemical differences between K-65 residues and Silo 3 cold metal oxides. The FS Report for Operable Unit 4, Appendix C, discusses the results of bench scale treatability studies which indicate that cementation of the Silo 3 metal oxides would result in an approximately 50 percent increase in the volume of treated material requiring disposal.

Implementation Time and Costs

Remedial action activities under Alternative 2B/Cem could be completed in about four years. Site preparation and construction activities would take approximately three years. Removal and material processing activities would require about one year. Capital costs for Alternative 2B/Cem are estimated to be 35.9 million dollars. O&M costs during remediation are estimated at 4.9 million dollars over one year, while post-remediation O&M costs are estimated at 3.2 million dollars over a thirty year period. The total present worth cost for this alternative is estimated at 37.4 million dollars.

7.3.3 Alternative 3B.1/Vit - Removal, Vitrification, and Off-Site Disposal - NTS

Capital Cost: $26.8 M

O&M Costs:

During Remediation: $4.9 M

Post-Remediation: $0

Present Worth: $28 M

Years to Implement: 4

This alternative involves the removal, stabilization, and off-site disposal of the Silo 3 contents. This alternative is identical to Alternative 2B/Vit, except the on-property disposal, monitoring, and institutional controls have been replaced by the transportation of the treated material by rail and/or truck to the NTS fr disposal. Under Alternative 3B.1/Vit, approximately 3,890 m3 (5,088 yd3) of untreated mataials would be removed from the silo. Approximately 1,471 m3 (1,923 yd3) of vitrified material would be packaged in containers and transported to NTS for disposal. Alternative 3B.1/Vit would have to meet applicable off-site requirements, which include the NTS material acceptance criteria and DDI regulations pertaining to the transport of hazardous and radioactive materials. No five-year reviews would be required since all Subunit B wastes would be removed from the site under this alternative.

Implementation Time and Costs

Remedial action activities under Alternative 3B.1/Vit could to be completed in about four years. Site preparation and construction activities would take approximately three years. Removal activities would require about one year. Transportation and off-site disposal would conclude shortly after the completion of material processing. Capial costs for Alternative 3B.1/Vit are estimated to be 26.8 million dollars. 0&M costs during remediation are estimated at 4.9 million dollars over one year. Due to the off-site disposal option, there are no post-remediation O&M costs associated with this alternative. The total present worth cost of this alternative is estimated at 28 million dollars.

7.3.4 Alternative 3B.1/Cem - Removal, Cement Stabilization, and Off-Site Disposal - NTS,

Capital Cost: $36.8 M

O&M Costs:

During Remediation: $4.1 M

Post-Remediation: $0

Present Worth: $36 M

Years to Implement: 4

This alternative is identical to Alternative 3B.1/Vit (Section 7.3.3), except that Silo 3 contents would be stabilized in cement prior to off-site disposal at NTS as described for Alternative 2B/Cem (Section 7.3.2). Under Alternative 3B.1/Cem, approximately 3,890 m3 (5,088 yd3) of contaminated materials would be removed from Silo 3. Approximately 5,999 m3, (7,846 yd3), of stabilized material would be transported to NTS for disposal. No five-year reviews would be required since all Subunit B wastes would be removed from the site under this alternative.

Implementation Time and Costs

Remedial action activities under Alternative 3B.1/Cem could be completed in about four years. Site preparation and construction activities would take approximately three years. Removal activities would require about one year. Transportation and off-site disposal would conclude shortly after the completion of material processing. Capital costs for Alternative 38.1/Cem are estimated to be 36.8 million dollars. O&M costs during remediation are estimated at 4.1 million dollars over one year.

Due to the off-site disposal option, there are no post-remediation O&M costs associated with this alternative. The total present worth cost of this alternative is estimated at 36 million dollars.

7.3.5 Alternative 4B - Removal and On-Property Disposal

Capital Cost: $21.8 M

O&M Costs:

During Remediation: $1.1 M

Post-Remediation: $3.2 M

Present Worth: $22.0 M

Years to Implement: 2

This alternative requires removal of the Silo 3 contents, packaging, and on-property disposal of the untreated material. This alternative is identical to Alternative 2B, with the exception that it does not include treatment. Under Alternative 4B, approximately 3,890 m3 (5,088 yd3) of contaminated materials would be removed from Silo 3 and packaged in containers for disposal in an on-property above grade reinforced concrete disposal vault. The Silo 3 structural materials, associated soils, and removal system would be managed under the Subunit C alternative. In accordance with CERCLA 121(c) requirements, after commencement of remedial activities, a review would be performed every five years by the EPA to ensure the continued protection of human health and the environment.

Implementation Time and Costs

Remedial action activities under Alternative 4B could be completed in about two yesrs. Site preparation and construction activities would take approximately one year. Removal and packaging activities would require about one year. Capital costs for Alternative 4B are estimated to be 21.8 million dollars. O&M costs during remediation are estimated at 1.1 million dollars over one year. Post-remediation O&M costs are estimated to be 3.2 million dollars. The total present worth cost of this alternative is estimated at 22 million dollars.

7.4 SUBUNIT C - SILOS 1,,2, 3, AND 4 STRUCTURES, SOILS, AND DEBRIS

This section presents the alternatives which were evaluated for Subunit C during the detailed analysis of alternatives phase of the FS for Operable Unit 4. These alternatives focus on the remediation of Silos 1, 2, 3, and 4 structures, contaminated soils within the Operable Unit 4 boundary including surface and subsurface soils and the earthen berms around Silos 1 and 2, the existing Ration Treatment System (RTS), the K-65 Drum Handling Building pad, standing water within Silo 4 (if any), the decant sump tank, the process piping and trenches, and any rubble or debris [i.e., decontamination and decommisioning (D&D) of the treatment facility] generated consequential to the implementation of remedial actions for all Operable Unit 4 subunits. The volumes of soil, rubble, and debris to be generated under Subunit C are small in comparison to the volume of similar materials that will be generated by other FEMP operable units. All the Subunit C alternatives evaluated through detailed analysis consider integration of disposal activities with Operable Unit 3 and Operable Unit 5. These integration efforts allow waste minimization initiatives developed for Operable Units 3 and 5 to be integrated into the final remedy chosen for Subunit C materials.

As discussed in Section 6, evaluations were conducted for future land uses with and without continued federal ownership. For a cleanup remedy to be considered protective, it would not result in any unacceptable risks to an Operable Unit 4 expanded trespasser or an off-site farmer under the future land use with continued federal ownership scenario.

All of the evaluated alternatives would limit exposure to constituents by decontaminating, demolishing, and removing the material to either an on-property above-grade disposal facility or off-site disposal facility, and then excavating contaminated soils and placing clean fill over residual contaminated substance soils. The placement of the clean fill was not used as a measure to limit exposures but rather to restore the natural drainage patters and promote revegetation. Table 9-2 summarizes the proposed remedial levels for soils, all of which wald be protective to the Operable Unit 4 expanded trespasser, trespassing child and off-site resident over the long-term. Short-term risks would be higher for off-site disposal due to the increased risk of transportation accidents. These action alternatives would be protective of all anticipated receptors assumming continued federal government ownership and control of the area; this includes the off-site farmer and the Operable Unit 4 expanded trespasser receptors.

The basic difference among the action alternatives is the disposal option. On-property disposal (Alternative 2C) would be in an above-grade disposal facility. Off-site disposal options include NTS (Alternative 3C.1) and a permitted commercial disposal site (Alternative 3C.2).

The on-property, above grade disposal facility would be designed for a 1,000 year life with no active maintenance. Fate and transport modeling using conservative assumptions concludes that protectiveness would be maintained over the long-term. NTS and the permitted commercial disposal facility would incorporate engineering controls to ensure protectiveness. Both are located in a climatic, demographic, and hydrogeologic setting which favors minimization of constituent migration to human or environmental receptors. Short-term risks to the public and workers are slightly greater for the off-site disposal options due to the increased risks of transportation accidents resulting in injuries or radiation exposure.

For all of the Subunit C alternatives, hazardous substances (i.e., contaminated soil or debris) will remain on site at levels which preclude unlimited use or unrestricted exposure. Therefore, in accordance with the requirements of CERCLA 121(c), all the Subunit C alternatives would require that a review be conducted every five years, after commencement of remediation to ensure that the alternative continues to provide adequate protection of human health and the environment.

7.4.1 Alternative 2C - Demolition, Removal, and On-Property Disposal

Capital Cost:	$36.3
O&M Costs:	
During Remediation:	$0
Post-Remediation:	$3.6 M
Present Worth:	$34.3 M
Years to Implement:	2

Alternative 2C involves the demolition of the Silos 1, 2, 3, and 4 structures and disposal of the materials from the removal of the earthen berm, decant sump tank, process piping, and trenches. Alternative 2C further addresses the excavation of contaminated subsurface soils within the operable unit boundary and disposal of the debris generated as a result of implementing remedial actions for Subunits A and B. Contaminated material would be placed in an above-grade disposal vault at the FEMP site. Under Alternative 2C, approximately 34,956 m3 (45,748 yd3) of material would be placed in an on-property above-grade disposal vault.

Demolition and Decontamination of the Silo Structures

Before Silos 1, 2, 3, and 4 are demolished, loose interior materials and concrete would be removed from the silo surfaces. Concrete exhibiting highly elevated direct radiation levels would be segregated from other Subunit C waste and dispositioned as part of the selected remedy for Subunit A. Silo demolition would consist of the systematic decontamination, removal, dismantling, and disposal of the Silos 1, 2, 3, and 4 domes, walls, floor slabs and footers. Removal would involve cutting each of the silo structures into manageable pieces after appropriate bracing has been installed. The demolition would begin wth the dismantling of Silo 4, since this silo has never been used, making it an ideal full-scale model to test and confirm demolition methodologies with minimal risk of radiological release to the environment Based on experience obtained through the dismantling of Silo 4, demolition of Silos 1, 2, and 3 would proceed according to the sequencing and procedures established during the remedial design and remedial action phases.

Demolition and Decontamination of Other Operable Unit 4 Structures

The existing RTS, Drum Handling Building pad, sump lift station foundation, concrete pipe trench, and the decant sump would also be removed and decontaminated. It is estimated that approximately 790 m (2,600 ft) of process piping in the process piping trenches would be cut into manageable sections and disposed. It is estimated that 280 m3, (365 yd3 of concrete from the trench, decant sump tank process piping, and existing RTS would be disposed. Additionally, all facilities constructed and equipment installed and used to implement the selected alternatives for Subunit A and B would be dissasembled, decontaminated (if necessary), and either recycled, reused, or disposed.

Non porous materials, such as steel fencing and structural steel, attaining the unrestricted use, free release criteria defined in DOE Order 5400.5 would be released from the site as uncontaminated Materials not attaining these levels would be retained for disposal as contaminated waste consistent with the approved

Operable Unit 3 Record of Decision.

Remediation of Soil

After the silos are demolished, the contaminated surface soils within the boundary of Operable Unit 4 would be excavated to attain proposed remediation levels for each of the constituents of concern. After the silos are demolished, the contaminated surface soils within the boundary of Operable Unit 4 would be excavated to attain proposed remediation levels, as described in Section 9.2.2 of this ROD, for each of the contaminants of concern. Attainment of these levels would be demonstrated applying regulatory guidance available at the time. The cleanup levels are considered protective of the hypothetical expanded trespasser receptor. To attain these goals, a minimum of 15 centimeters.(cm) [6 inches (in)] of soils across the entire operable unit area would be excavated. Additional soils beneath the silos, decant sump tank, concrete pipe trench, or other locations below this depth would be removed as necessy to attain these cleanup goals.

Soils exhibiting highly elevated direct radiation levels (i.e., potentially contaminated soils beneath Silos 1 and 2) would be segregated from other Subunit C wastes and dispositioned as part of the selected remedy for Subunit A. Following excavation, the affected areas would be resumed to original grade with the placement of clean backfill and seeded. The area would then be fenced and appropriate signs placed indicating no trespassing and no hunting. Continued federal ownership with appropriate deed restrictions would be implemented to ensure that any future transfer of property would be consistent with CERCLA 120(h).

Water Treatment

Wastewater generated as a result of this remedial action, along with water removed from the decant sump tank, Silo 4 (if any), and any perched groundwater encountered during remedial activities would be collected, pretreated if necessary, and sent to the FEMP Advanced Wastewater Treatment facility for treatment prior to discharge to the Great Miami River. In accordance with the Amended Consent Agreement, groundwater remediation will be handled by Operable Unit 5. Operable Unit 4 would only handle the cleanup of perched water encountered during remedial action activities.

Disposal of Soil, Debris, and Rubble

The volume of contaminated soil, rubble, and debris to be addressed under Operable Unit 4 represents a small fraction (less than one percent) of the total volume of similar wastes to be addressed under Operable Units 5 and 3. Operable Unit 3 is currently in the process of conducting a RI/FS which will include gaining additional insight into the effectiveness of various decontamination technologies on building materials. Additionally, the Operable Unit 3 RI/FS is evaluating the appropriate type and location of disposal for contaminated rubble and debris. The decision on the Operable Unit 3 RI/FS is presently scheduled at a tune which coincides with the implementation of remedial actions for Operable Unit 4.

Contaminated soil and debris generated from the selected remedy for Operable Unit 4 will be placed into interim storage, if necessary, and final disposition of that material will be determined as part of the Record of Decision for Operable Units 5 and 3. Placing the Operable Unit 4 on-property disposal decision in abeyance permits an integrated site-wide (FEMP) disposal approach for soil and debris. ln addition, Operable Unit 4 would be able to take advantage of any applicable waste minimization initiatives developed for soil and debris by Operable Units 5 and 3 respectively.

Implementation Time and Costs

Approximately three months would be required for site preparation; 15 months would be required to demolish and decontaminate the silo structures as well as the surface soil, berm soils, subsurface soils, process piping, and decant sump tank. Demobilization activities would extend the duration of the alternative to two years. During this time frame, the above-grade disposal facility would also be constructed and capped. Capital costs for Alternative 2C are estimated to be 36.3 million dollars. Post-remediation O&M costs are estimated to be 3.6 million dollars. Tbe total present worth cost of this alternative is estimated at 34.3 million dollars.

7.4.2 Alternative 3C. 1 - Demolition, Removal, and Off-Site Disposal - NTS

Capital Cost: $83.6 M

O&M Costs: $0

Present Worth: $75.5 M

Years to Implement: 2

This alternative is identical to Alternative 2C, except that the on-property disposal, monitoring, and institutional controls have been replaced by packaging and off-site transportation of the material by rail or truck to the NTS for disposal. Tbe off-site disposal option for Alternative 3C.1 involves the packaging, loading, and shipping of the material generated by this alternative to the NTS.

Implementation Time and Costs

Remedial actions for Alternative 3C.1 could require about two years to complete, including the transportation of the packaged materials to tbe NTS. Capital costs for Alternative 3C.1 are estimated to be 83.6 million dollars. Due to the off-site disposal aspect of this alternative, there are no O&M costs anticipated. The total present worth cost of this alternative is estimated at 75.5 million dollars.

7.4.3 Alternative 3C.2 - Demolition, Removal, and Off-Site Disposal (Permitted Commercial Disposal Site)

Capital Cost: $48.6 M

O&M Costs: $0

Present Worth: $44.0 M

Years to Implement: 2

This alternative is identical to Alternative 3C.1, except that the off-site disposal at the NTS has been replaced by the off-site disposal at a permitted commercial disposal site and the waste will not be packaged, but rather it would be shipped in bulk. One such site is located near Clive, Utah, approximately 3,058 km (1,900 mi) from the FEMP site. The facility has been permitted by the State of Utah to accept mixed hazardous waste and naturally occurring by-product materials such as those in Subunit C.

Disposal

Due to its relatively long distance from the FEMP site, coordination with several states for transportation of Subunit C wastes would be required. Additionally, an exemption from DOE Order 5280.2A prohibiting disposal of DOE wastes at a commercial facility would be needed for the Operable Unit 4 waste before it could be transported to the disposal site.

Implementation Time and Costs

Remedial actions for Alternative 3C.2 would require about two years to complete, including the transportation of the materials to a permitted commercial disposal site. Capital costs are estimated to be 48.6 million dollars. Due to the off-site disposal option, no operation and maintenance (O&M) costs are anticipated for Alternative 3C.2. The total present worth cost of this alternative is estimated at 44.0 million dollars.

8.0 SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

8.1 EVALUATION CRITERIA

Specific legal requirements for remedial actions are specified under CERCLA Section 121. These requirements include protection of human health and the environment, compliance with ARARs (unless a waiver is obtained), a preference for permanent solutions which use treatment as a principal element (to the maximum extent possible), and cost-effectiveness. To determine whether alternatives meet the requirements, EPA has identified nine criteria in the National Oil and Hazardous Substances Pollution Contingency Plan that must be evaluated for each alternative selected for detailed analysis. These criteria are as follows:

1. Overall protection of human health and the environment: Examines whether a remedy would provide adequate overall protection to human health and the environment in the short- and long-term. Evaluates how risks would be eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls included in the alternative.

2. Compliance with ARARs: Addresses whether the alternative attains compliance with federal and state environmental laws and requirements, unless a waiver of an ARAR applies.

3. Long-term effectiveness and permanence: Evaluates the permanence of the remedy, long term effectiveness and likelihood that the remedy will be successful.

4. Reduction of toxicity, mobility, or volume through treatment: Reviews the anticipated treatment technologies to reduce the hazards of, prevent the movement of, or reduce the quantity of waste materials.

5. Short-term effectiveness: Evaluates the ability of a remedy to achieve protection of workers, the public, and the environment during construction and implementation of the remedial action.

6. Implementability: Examines the practicality of carrying out a remedy, including the availability of materials and services needed during implementation of the remedial action.

7. Cost: Reviews both estimated capital and operation and maintenance costs of the remedy. Costs are presented as present worth costs. "Present worth" is defined as the amount of money that, if invested in the first year of implementing a remedy and paid out as needed, would be sufficient to cover all costs associated with the remedy over its planned life. Present worth costs allow remedies that would occur over different time periods to be compared on an even basis.

8. State Acceptance: Evaluates the technical and administrative issues and concerns that the State of Ohio may have regarding each of the alternatives; and the State comments on ARARs or proposed use of waivers.

9. Community Acceptance: Evaluates the issues and concerns the public may have regarding each of the alternatives, including which parts of the alternatives are supported or opposed.

The first two criteria are considered threshold criteria and must be met by the final remedial action alternatives for Operable Unit 4 (unless a specific ARAR is waived). The next five criteria are considered primary balancing criteria and are considered together to identify significant tradeoffs that must be addressed. The last two are considered modifying criteria which are considered in final remedy selection. The alternatives comparison for each subunit is summarized in Table 8-1.

8.2 COMPARATIVE ANALYSIS OF ALTERNATIVES

The following sections summarize the information presented in Section 5.0 of the FS Report for Operable Unit 4 and rely upon the detailed analysis of alternatives presented in Section 4.0 of the same report.

8.2.1 Analysis for Subunit A

8.2.1.1 Threshold Criteria

The analysis of the Subunit A alternatives against the threshold criteria of overall protection of human health and the environment and compliance with ARARs is summarized below.

Overall Protection of Human Health and the Environment. As part of the FS, two potential future land uses of the FEMP were evaluated to assess the ability of the individual alternative to adequately protect human health and the environment. These land uses consider potential exposures to contaminants released during or following the implementation of the alternatives and were evaluated for a range of viable receptors. These scenarios included future land use with and without the assumption of continued federal ownership. With continued government ownership, the FEMP land would not be available for residential or farming use. Access to the site would be limited by fencing and physical markers, it would be reasonable to assume that an Operable Unit 4 expanded trespasser would visit the site occasionally.

It is also assumed that the land surrounding the FEMP site would continue to be used for family farms. For a cleanup remedy to be considered protective, it should not result in any unacceptable risks to an expanded trespasser or an off-site farmer. The evaluation also considers the future possibility that the federal government might not have control of the FEMP site. In that case, a farm might be established on the FEMP property. The remedial alternatives were evaluated as to what risks might exist for a hypothetical on-property farmer if government control is no longer present. The basis for and detailed results of these evaluations are in Appendix D of the FS Report for Operable Unit 4.

TABLE 8-1

COMPARISON OF REMEDIAL ALTERNATIVES

SUBUNIT A - SILOS 1 AND 2 CONTENTS

Alternative	Overall Protection of Human Health and Environment	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility or volume through treatment	Short-Term Effectiveness	Implementability	Total Present Worth Cost
0A - No Action	Not Protective	Does not comply with all ARARs	Not effective or permanent	No treatment; therefore, no reduction	High	Easy	-0-
3A.1/Vit - Removal, Vitrification, Off-Site Disposal - Nevada Test Site	Protective	Complies with all ARARs	Effective and most reliable	Reduces toxicity, mobility, and volume	Medium	Innovative technology, Difficult	$43.7M
3A.1/Cem - Removal, Cement Stabilization, Off-Site Disposal - Nevada Test Site	Protective	Complies with all ARARs	Effective and most reliable	Reduces mobility	Medium	Reliable technology, Difficult	$73.1M

[1]Assessment of protectiveness adopts the use of continued federal government ownership and evaluates risk to expanded trespasser and the off-property farmer.

[2]Assumes substantive technical requirements for Ohio disposal facility siting are met.

Bold--Preferrred Remedial Action Alternative.

Shaded areas--Did not meet threshold criteria (Overall Protection or Compliance with ARARs), therefore, not compared.

Protective--Risk is within the one in ten thousand to one million (104 to 106) EPA target risk range.

TABLE 8-1
(Continued)

SUBUNIT B - SILO 3 CONTENTS

Alternative	Overall Protection of Human Health and environment	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility or volume through treatment	Short-Term Effectiveness	Implementability	Total Present Worth Cost
0B - No-Action	Not Protective	Does not comply with all ARARs	Not effective or permanent	No treatment; therefore, no reduction	High	Easy	-0-
2B/Vit - Removal, Vitrification, On-Property Disposal	Protective[1]	Complies with all ARARs[2]	Effective and reliable	Reduces toxicity, mobility, and volume	Medium	Innovative technology, Moderately Difficult	$28M
2B/Cem - Removal, Cement Stabilization, On-Property Disposal	Protective[1]	Complies with all ARARs[2]	Effective and reliable	Reduces mobility	Medium	Reliable technology, Easy	$37.4M
3B.1/Vit - Removal, Vitrification, Off-Site Disposal - NTS	Protective	Complies with all ARARs	Effective and most reliable	Reduces mobility and volume	Medium	Innovative technology, Difficult	$28M
3B.1/Cem - Removal, Cement Stabilization, Off-Site Disposal -	Protective	Complies with all ARARs	Effective and most reliable	Reduces mobility	Medium	Reliable technology,	$36M

NTS Difficult

4B - Removal and On-Property Protective1 Complies with all Effective and No
treatment; High Reliable $22M
Disposal ARARs[2] reliable
therefore, no technology,
reduction Easy

1Assessment of protectiveness adopts the use of continued federal government ownership and evaluates risk to expanded trespasser and the off-property farmer.

[2]Assumes substantive technical requirements for Ohio disposal facility siting are met.

Bold--Preferrred Remedial Action Alternative.

Shaded areas--Did not meet threshold criteria (Overall Protection or Compliance with ARARs), threfore, not compared.

Protective--Risk is within the one in ten thousand to one in a million USEPA target risk range.

TABLE 8-1
(Continued)

SUBUNIT C - SILOS 1,2,3 and 4 STRUCTURES, SOILS, and DEBRIS

Alternative	Overall Protection of Human Health and Environment	Compliance	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility or volume through treatment	Short-Term Effectiveness	Implementability	Total Present Worth Cost
0C - No Action	Not Protective	Does not comply with all ARARs	Not effective or permanent	No treatment; therefore, no reduction	High	Easy	-0-
2C - Demolition, Removal, On-Site Disposal	Protective[1]	Complies with all ARARs[2]	Effective and reliable	No treatment; therefore, no reduction	Mediunm	Reliable technology, Easy	$34.3M
3C.1 - Demolition, Removal, Off-Site Disposal - Nevada Test Site	Protective	Complies with all ARARs	Effective and most reliable	No treatment; therefore, no reduction	Medium	Reliable technology, Moderately difficult	$75.5M
3C.2 - Demolition, Removal, Off-Site Disposal - Permitted Commercial Facility	Protective	Complies with all ARARs	Effective and most reliable	No treatment; therefore, no reduction	Medium	Reliable technology Moderately difficult	$44M

[1]Assessment of protectiveness adopts the use of continued federal government ownership and evaluates risk to expanded trespasser and the off-property farmer.
[2]Assumes substantive technical requirements for Ohio disposal facility siting are met.

Bold--Preferrred Remedial Action Alternative.

Shaded areas--Did not meet threshold criteria (Overall Protection or Compliance with ARARs), threfore, not compared.

Protective--Risk is within the one in ten thousand to one in a million USEPA target risk range.

All of the alternatives would provide protection of human health and the environment by eliminating, reducing, or controlling risk through treatment, engineering controls, or institutional controls. The preferred alternative (3A.1/Vit) would provide for overall protection, because the Subunit A residues would be treated and removed to the NTS. The source of risks to the Operable Unit 4 expanded trespasser and off-site farmer would be eliminated, and in the event that the government lost control of the FEMP site, there would be no risk from Subunit A residues to an on-property farmer. Overall protection at the NTS would be maintained because the vitrified residues resist leaching and the NTS is located in a sparsely populated, arid region, where depths to groundwater are at least 235 m (771 ft) below the surface.

Compliance with ARARs. CERCLA requires that remedial actions achieve a standard or level of control that is consistent with federal and state environmental laws or state siting regulations, which are termed applicable or relevant and appropriate requirements (ARARs). ARARs apply to all aspects of remedial action, including the establishment of cleanup levels, the operation and performance of treatment systems, and the design of disposal facilities. In addition to meeting ARARs, operations at DOE-owned facilities must be conducted according to DOE Orders. Although DOE Orders are not promulgated standards, the technical requirements may be adapted if they cover areas not addressed by other laws, or if they improve protection of human health and the environment because they are more stringent than existing laws. Detailed discussion of compliance with ARARs is provided in Appendix F of the FS Report for Operable Unit 4.

With the exception of Alternatives 2A/Vit, 2A/Cem (see Section 11 for details) and the no action alternative, all of the Subunit A alternatives would meet ARARs. Since the preferred alternative, Alternative 3A.1/Vit, includes off-site disposal at NTS, there would be no long-term compliance issues associated with the FEMP site. For example, off-site disposal would eliminate the need to demonstrate that drinking water MCLs are attained for Subunit A residues. In the short-term, the on-property remediation activities during removal and treatment would address the operational requirements for airborne emissions, soil pathways, and penetrating radiation by engineered controls.

For Alternative 3A.1/Vit, the packaging and transportation of the treated waste would comply with the requirements for the protection of worker and public safety from the radiological hazards (49 CFR §171-177). This alternative would also comply with other off-site requirements, such as the waste acceptance criteria specified by NTS, to meet their disposal requirements. The probability of an inadvertent intruder coming in contact with the Subunit A residues at NTS is less than that for the FEMP site, based on the demographic characteristics of both locations.

8.2.1.2 Primary Balancing Criteria

Those alternatives which satisfy the threshold criteria comparative analysis were carried forward to the primary balancing criteria for further comparative analysis. Because Alternative OA (No Action) did not satisfy either of the threshold criteria, and Alternatives 2A/Vit and 2A/Cem (see Section 11 for details) do not satisfy compliance with specific ARARs, these alternatives were not considered further in this analysis.

Long-Term Effectiveness and Permanence. Alternatives 3A.1/Vit and 3A.1/Cem would ensure long-term protectiveness to human health and the environment because residual risks to viable receptors (off-site farmer and expanded trespasser) would be less than a 10-6 incremental lifetime cancer risk, and no non-carcinogenic effects (hazard index less than 0.2) would be indicated for either receptor.

All alternatives involve the removal and treatment of Subunit A residues by either vitrification or cement stabilization. The preferred alternative would be most effective based on the results of bench-scale treatability studies conducted during the RI/FS (Feasibility Study Report for Operable Unit 4, Appendix C) on the Subunit A materials which demonstrated that vitrification would be effective in reducing radon emanadon and in minimizing the leaching of constituents. Tests using cement stabilization demonstrated that this process would be effective in preventing the movement of constituents from the stabilized form; however, there was little or no reduction in radon emanation rates. The vitrified material is expected to have greater durability over the long term.

The characteristics (i.e., demographics, climate, geology, groundwater level) of the NTS would provide for greater certainty than FEMP on-properny disposal over the long term, that the treated residues would not affect human health and the environment.

Reduction of Toxicity, Mobility, or Volume through Treatment. Alternative 3A.1/Vit would use the vitrification process to treat the Subunit A material. This technology would physically bind the contaminants in a glass-like matrix which would significantly reduce contaminant mobility and material volume. Mobility would be reduced because the contaminants would be bound in the matrix and the volume of the treated material would be less than 50 percent of the untreated material volume. Vitrification would also destroy organic contaminants in the treated material. Although most contaminants in the treated material would be incorporated into the vitrified product to reduce mobility over the long term, some contaminants would be released during the vitrification process and must be treated through an off-gas treatment system. The material generated through the off-gas treatment system may require stabilization to limit subsequent contaminant mobility.

Alternative 3A.1/Cem-would use the cement stabilization process to treat contaminated material. This technology will physically and chemically bind the constituents in a cement-like matrix, so the mobility of constituents via leaching from this treated material would be greatly reduced. However, organic constituents would not be destroyed. The total volume of material would increase by approximately 150 percent as a result of adding the cement stabilizing and setting agents.

Alternative 3A.1/Vit is favored over Alternative 3A.1/Cem because they would: reduce the toxicity of organic comaminants; more effectively reduce the radon emanation from the treated material; generate a treated form which has very good resistance to leaching; and significantly reduce the volume of Subunit A materials.

Short-Term Effectiveness. Alternatives 3A.1/Vit and 3A.1/Cem, the various removal, treatment, and disposal activities will result in increased short-term risks for exposures (compared to no action). The short-term effectiveness of the material removal operations is expected to be the same among all alternatives for Subunit A. There is some uncertainty associated with controlling and treating the off- gases generated by the vitrification process. The on-property risks for 3A.1/Cem from transportation would be higher than 3A.1/Vit, because the increased volume of the treated material would increase the number of potential transportation accidents. Short-term impacts at the NTS associated with the transportation and off-loading of the treated residues would be indistinguishable from normal operations.

In summary, Alternative 3A.1/Cem is favored over Alternative 3A.1/Vit because of the uncertainty associated with off-gas control and treatment for the vitrification process.

Implementability. The removal and treatment activities in Alternative 3A.1/Cem could be implemented using standard equipment, procedures, and readily available resources. Hydraulic removal is a standard mining technology that is normally reliable and uses readily available equipment. The cement stabilization technology has been applied successfully at a number of remedial sites. EPA considers cement stabilization a demonstrated treatment technology and has approved its use in the final remedy for many NPL sites. This technology has also been applied at other sites that have radioactively contaminated waste. The cement stabilization process would require large quantities of cement, flyash, and blast furnace slag, which are available.

Although removal and disposal are the same for Alternative 3A.1/Vit as for Alternative 3A.1/Cem, the vitrification process is more difficult to implement than the cement stabilization process. The vitrification process would require fewer chemical reagents than the cement stabilization process, but larger amounts of energy (electricity). Vitrification would allow the re-processing of off-specification treated materials compared to cement stabilization. However, the vitrification process equipment would be more complex to construct and operate than that of the cement stabilization process. There is limited experience available for the types and quantities of the material from the silos and decant sump tank on which to base an assessment of the likely performance of the vitrification technology. The vitrification technology is not as widely available as the cement stabilization technology. Off-gas treatment is also an additional complexity with vitrification where delays could occur. However, operational experience is being gained as part of the structured RI/FS treatability studies and planned vitrification pilot studies currently in progress.

Alternatives 3A.1/Vit and 3A.1/Cem involve off-site transportation and disposal at the NTS. While technically straightforward, off-site transportation would require coordination efforts with a number of states located along the transportation route, as well as the State of Nevada. Demonstrated compliance with the NTS waste acceptance criteria would be required prior to shipping the Subunit A materials. The transportation of this material would also comply with the off-site acceptability amendment to CERCLA's implementing regulations, the National Contingency Plan [58 FR 49200 (September 22, 1993)].

In summary, Alternative 3A.1/Cem would be favored over Alternative 3A.1/Vit, based on relative overall implementation.

Cost. The estimated total present worth costs for the Subunit A alternatives are provided on Table 8-2, and include a breakdown of capital and operating and maintenance costs. The present worth cost of Alternative 3A.1/Cem is approximately 67 percent more expensive than Alternative 3A.1/Vit, primarily due to the additional packaging, transportation, and disposal for the larger volume of cement-stabilized material.

8.2.1.3 Modifying Criteria

State Acceptance

The State of Ohio reviewed the preferred remedial alternative for Subunit A that was provided in the PP, and concurs with the selection of Alternative 3A.1/Vit. A letter from the OEPA conditionally approving the FS and PP for Operable Unit 4 can be found in Appendix E of this ROD.

Community Acceptance

DOE solicited input from the community on the preferred remedial alternative for Subunit A that was provided in the PP. Verbal comments received during the public meeting indicated support of the chosen remedial alternative. Written comments received during the public comment period are addressed in the responsiveness summary (see Appendix C).

8.2.1.4 Subunit A Comparative Analysis Summary

Alternative 3A.1/Vit is identified as the preferred alternative because it would result in the permanent treatment and volume reduction of Subunit A materials and it is cost effective. It would provide overall protection of human health and the environment with fewer uncertainties over the long-term.

8.2.2 SUBUNIT B

8.2.2.1 Threshold Criteria

Subunit B alternatives would employ the same removal, treatment, and disposal options as those for Subunit A materials. Many of the factors considered and discussed under the Subunit A analysis are identical for Subunit B. Therefore, frequent references will be made to the information presented previously in Section 8.2.1. Only those factors unique to remediation of the Subunit B materials will be emphasized. This approach will be applied to the discussions under the primary balancing criteria as well.

TABLE 8-2
OPERABLE UNIT 4 REMEDIAL ALTERNATIVE COST SUMMARY (MILLION $)

ALTERNATIVE	CAPITAL	OPERATING & MAINTENANCE SHORT-TERM (During Remediation)	OPERATING & MAINTENANCE LONG-TERM (Post Remediation)	TOTAL PRESENT WORTH COST
Subunit A - Silos 1 and 2 Contents				
OA - No Action	0	0	0	0
3A.1/Vit - Removal, Vitrification, Off-Site Disposal - Nevada Test Site	38.3	11.7	0	43.7
3A.1/Cem - Removal, Cement Stabilization, Off-Site Disposal - Nevada Test Site	71.8	11.7	0	73.1
Subunit B - Silo 3 Contents				
0B - No action	0	0	0	0
2B/Vit - Removal, Vitrification, On-Property Disposal	25.2	4.9	3.2	28
2B/Cem - Removal, Cement Stabilization, On-Property Disposal	35.9	4.9	3.2	37.4
3B.1/Vit - Removal, Vitrification, Off-Site Disposal - Nevada Test Site	26.8	4.9	0	28
3B.1/Cem - Removal, Cement Stabilization, Off-Site Disposal - Nevada Test Site	36.8	4.1	0	36
4B - Removal, On-Property Disposal	21.8	1.1	3.2	22
Subunit C - Silos 1,2,3, and 4 Structures, Soils, and Debris				
0C - No Action	0	0	0	0
2C - Demolition, Removal, On-Property Disposal	36.3	0	3.6	34.3
3C.1 - Demolition, Removal, Off-Site Disposal - Nevada Test Site	83.6	0	0	75.5
	48.7	0	0	44

3C.2 - Demolition, Removal, Off-Site Disposal - Permitted
Commercial Facility

NOTES:
The accuracy of thew cost estimates are between +50% and -30%.
Estimates of capital and operations and maintenance costs are expressed in terms of total costs. The total present worth costs are calculated from the total cost figures applying
a discount rate of 7 percent and an operating and maintenance period of 30 years.

The comparison of the Subunit B alternatives against the threshold criteria of overall protection of human health and the environment and compliance with ARARs is summarized below.

Overall Protection of Human Health and the Environment. As discussed in Section 8.2.1.1, this evaluation assumes that the federal government would continue to own the FEMP site. For a cleanup remedy to be considered protective, it should not result in any unacceptable risks to an expanded trespasser or an off-site farmer.

All alternatives, with the exception of the no-action alternative (OB), would provide overall protection of human health and the environment. These alternatives will eliminate, reduce, or control the health or enviromnental risks resulting from constituents in Subunit B materials. Except for Alternative 4B, the alternatives would limit exposure to contaminants by removing the material, treating the material by either vitrification or cement stabilization. The treated material is disposed in an on-property above grade disposal vault for Alternative 2B or off-site at NTS for Alternative 3B.1. Alternative 4B's protection is based on removal and disposal in an on-property above-grade vault and institutional controls. All alternatives would attain long-term effectiveness.

In summary, Alternatives 3B.1/Vit and 3B.1/Cem would provide overall protection to the expanded trespasser and off-site farmer because they would remove the Subunit B residues from the FEMP site.

Comp]iance with ARARs. With the exception of the no-action alternative, Subunit B alternatives would comply with all pertinent ARARs. Under the no-action alternative, Silo 3 would eventually fail, resulting in the release of cold metal oxides to the environment. This scenario would likely result in radiological releases to the air, soil, groundwater, and surface water (via storm water runoff. For example, fate and transport modeling for this scenario indicates that the safe drinking water limits (MCLs in 40 CFR §141) would be exceeded for uranium, and gross alpha and beta radiation.

For those alternatives that include on-property disposal, an Alternative 4B is the least favorable on-property alternative because the material is not treated.

In summary, Alternatives 2B/Vit, 2B/Cem, 3B.1/Vit, 3B.1/Cem, and 4B, would meet all pertinent ARARs. Because the uncertainly associated with demonstrating that the FEMP on-property disposal vault would provide for the long-term protection of inadvertent intruders, Alternatives 3B.1/Vit and 3B.1/Cem are favored over 2B/Vit, 2B/Cem, and 4B.

8.2.2.2 Primary Balancing Criteria

Those alternatives that satisfy the threshold criteria comparative analysis were carried forward to the primary balancing criteria comparative analysis. Because Alternative 0B (No Action) did not satisfy either of the threshold criteria, it is not considered further in this analysis.

Long-Term Effectiveness and Permanence. All Subunit B alternatives would ensure long-term protectiveness to human health and the environment. For all alternatives, projected FEMP site residual risks to viable receptors (off-site farmer and expanded trespasser) would be less than 10-6 incremental lifetime cancer risk, and no non-carcinogenic effects (hazard index less than 0.2) would be indicated for either receptor.

The characteristics of the treated residue form (vitrification or cement stabilization) and the disposal options (on-property or off-site at NTS) are similar to those discussed under long-term effectiveness for Subunit A materials. Long-term environmental impacts are also the same as those considered for Subunit A.

In summary, Alternatives 3B.1/Vit and 3B.1/Cem provide a greater degree of long-term effectiveness than Alternatives 2B/Vit, 2B/Cem, and 4B.

Reduction of Toxicity, Mobility, or Volume through Treatment. Alternatives 2B/Vit and 3B.1/Vit would use the vitrification process to treat the Subunit B material. This technology would physically bind the contaminants in a glass-like matrix, which would significantly reduce contaminant mobility and material volume. Mobility would be reduced since the contaminants would be bound in the matrix and the volume of the treated material would be approximately 62 percent of the untreated material volume.

Alternatives 2B/Cem and 3B.1/Cem would use the cement stabilization process to treat the Subunit B material. This technology will physically and chemically bind the constituents in a cement-like matrix, so the mobility of constituents (via leaching from) in this treated material would be greatly reduced. However, the total volume of material will increase by 55 percent as a result of adding the cement stabilizing and setting agents.

Alternative 4B does not reduce toxicity, mobility, or volume because it does not include the treatment. In summary, Alternatives 2B/Vit and 3B.1/Vit are favored over Alternatives 2B/Cem, 3B.1/Cem, and 4B because they would generate a treated form which has very good resistance to leaching and would significantly reduce the volume of the Subunit B materials.

Short-Term Effectiveness. For the Subunit B action alternatives, the various removal, treatment, and disposal activities would result in increased short-term risks (compared to no action). The short-term effectiveness of removal operations is expected to be the same among all alternatives for Subunit B. There is some degree of uncertainty associated with controlling and treating the off-gases generated by the vitrification process.

The increased risks due to off-site transportation of the treated residues to NTS and the short-term environmental impacts associated with removal, treatment, and disposal are similar to those described in Section 8.2.1.2. Alternative 4B provides the highest short-term effectiveness because no treatment is provided.

In summary, Alternative 4B is the favored alternative, and Alternatives 2B/Cem and 3B.1/Cem are favored over Alternatives 2B/Vit and 3B.1/Vit because of the uncertainty associated with off-gas control and treatment for the vitrification process.

Implementability. The removal and treatment activities for all Subunit B action alternatives could be implemented with standard equipment, procedures, and readily available resources. Pneumatic removal would be employed for the Subunit B materials and it is a standard technology that is typically reliable and uses readily available equipment. All other aspects of implementing the action alternatives for Subunit B are identical to those discussed for Subunit A under the implementability criterion in Section 8.2.1.2.

In summary, Altemative 4B would be favored and Alternatives 2B/Vit and 3B.1/Vit would be the least favored, based on relative overall implementability.

Cost. The estimated total present worth costs for Subunit B Alternatives are provided in Table 8-2 and include a breakdown of capital and operating and maintenance costs.

Alternative 4B is the least expensive action altemative. The present worth costs of Alternatives 2B/Vit and 3B.1/Vit are approximately the same, and are about 6 million dollars higher than that of Alternative 4B. This is due to the treatment component of those alternatives not included in Alternative 4B. Alternatives 3B.1/Cem and 2B/Cem are approximately 30 percent and 34 percent more expensive, respectively, than Alternatives 3B.1/Vit and 2B/Vit, respectively. Alternative 3B.1/Cem is more expensive than Alternative 3B.1/Vit primarily due to the additional packaging, transportation, and disposal of the larger volume of cement-stabilized material.

8.2.2.3 Modifying Criteria

State Acceptance

The State of Ohio reviewed the preferred remedial alternative for Subunit B that wss provided in the Proposed Plan, and concurs with the selection of alternative 3B.1/Vit. A letter from the OEPA conditionally approving the FS and PP for Operable Unit 4 can be found in Appendix E of this ROD.

Community Acceptance

DOE solicited input from the community on the preferred remedial alternative for Subunit B that was provided in the Proposed Plan. Verbal comments received during the public meeting indicated support of the chosen remedial alternative. Written comments received during the public comment period are addressed in the responsiveness summary (see Appendix C).

8.2.2.4 Subunit B Comparative Analysis Summary

Alternative 3B.1/Vit is the preferred alternative because it is cost-effective and would result in the permanent treatment and volume reduction of Subunit B materials. Alternative 3B.1/Vit would provide overall protection of human health and the environment with fewer uncertainties over the long-term.

8.2.3 Subunit C

8.2.3.1 Threshold Criteria

The analysis of the Subunit C alternatives against the threshold criteria of overall protection of human health and the environment, and compliance with ARARs is summarized below.

Overall Protection of Human Health and the Environment. Alternative OC would not provide adequate protection of human health and the environment. As discussed in Section 8.2.1.1, evaluations were conducted for future land uses with and without continued federal ownership. For a cleanup remedy to be considered protective, it would not result in any unacceptable risks to an expanded trespasser or an off-site farmer under the future land use with continued federal ownership scenario, or an on-property farmer under the future land use without continued federal ownership.

All of the action alternatives (Alternatives 2C, 3C.1, and 3C.2) would limit exposure to constituents by decontaminating, demolishing, and removing the material to either an on-property above-grade disposal facility or off-site disposal facility, and then excavating contaminated soils and placing clean fill over residual contaminated subsurface soils. Section 9.2 presents and discusses the soil cleanup levels, all of which would be protective to the expanded trespasser and off-site resident over the long term. Short-term risks would be higher for off-site disposal due to the increased risk of transportation accidents.

The basic difference among the action alternatives is the disposal option. On-property disposal (Alternative 2C) would be in an above-grade disposal facility. Off-site disposal options include NTS (Alternative 3C.1) and a permitted commercial disposal site (Alternative 3C.2).

The on-property, above-grade disposal facility would be designed for a 1,000 year life with no active maintenance. Fate and transport modeling using conservative assumptions concludes that protectiveness would be maintained over the long term.

NTS and the permitted commercial disposal facility would incorporate engineering controls to ensure protectiveness. Both are located in a climatic, demographic, and hydrogeologic setting which favors minimization of constituent migration to human or environmental receptors.

In summary, Alternatives 3C.1 and 3C.2 would provide overall protectiveness because they would remove the Subunit C excavated soils and debris from the FEMP site.

Compliance with ARARs. All alternatives, other than Alternative 0C (No Action) would meet all pertinent ARARs. Under the no-action alternative, it would be likely that constituents would continue to be released to the air, groundwater, and surface water. There would also be a risk for direct contact with contaminated soil and exposure to direct radiation.

For Alternative 2C, an exemption to Ohio Administrative Code (OAC) rule 3745-27-07(B)(5) may be granted on the basis of meeting certain technical requirements. Supporting technical data for the proposed location of the disposal facility on the FEMP site must be developed to satisfy the requirements of OAC rule 3745-2747(B)(5).

In summary, Alternatives 3C.1, and 3C.2 would meet all pertinent ARARs. Alternative 2C would require a waiver of OAC rule 3745-27-07(B)(5) based on demonstration that it would meet certain technical requirements.

8.2.3.2 Primary Balancing Criteria

Those alternatives that satisfy the threshold criteria of compliance with ARARs and overall protection of human health and environment were carried forward to the primary balancing criteria comparative analysis. Because Alternative 0C (No Action) did not satisfy either of the threshold criteria, it is the only alternative not considered further in this analysis.

Long-Term Effectiveness and Permanence. All Subunit C alternatives would ensure long-term protectiveness to human health and the environment. For all alternatives, projected FEMP site residual risks to viable receptors (off-ilte farmer and expanded trespasser) would be less than 10-6 incremental lifetime cancer risk and no non-carcinogenic effects (hazard index less than 0.2) would be indicated for either receptor. Although residual contamination would remain in the Operable Unit 4 Study Area, the level of risk from the contaminated soil would be controlled by excavating soil that exceeds proposed cleanup levels, by placing clean soil over the excavated areas, and by providing appropriate access controls and deed restrictions.

Alternative 2C would employ an on-property disposal facility designed to minimize leachate generation from water infiltration and contact with contaminated soil and debris. Fate and transport modeling using conservative assumptions demonstrates that both risk- and ARAR-based protective levels would be maintained for the Great Miami Aquifer over the long term.

Alternatives 3C.1 (NTS) and 3C.2 (permitted commercial disposal facility) would provide long-term protectiveness because the residual soils and debris would be removed from the FEMP site.

Following completion of remedial operations, impacted areas would be restored; long-term environmental impacts are expected to be minor. Alternative 2C would result in permanent commitment of approximately 4.7 hectares (11.6 acres) of land for the disposal facility.

In summary, Alternatives 3C.1 and 3C.2 would provide a greater degree of long-term effectiveness than Alternative 2C.

Reduction of Toxicity, Mobility, or Volume through Treatment. Alternatives 2C, 3C.1, and 3C.2 will isolate the material from the environment by containment. Treatment of the contaminated silo structures, berm material, or soils is not included in any of the alternatives, so no reduction in toxicity, mobility, or volume would be achieved.

Short-Term Effectiveness. For all alternatives, the various demolition and removal activities would result in increased short-term exposures compared to no action. Alternatives 3C.1 and 3C.2 would pose additional risks to the public and workers associated with off-site shipment to the NTS or the permitted commercial disposal facility.

During the implementation of any of the action alternatives, the general public is not likely to be exposed to contaminants because of the distance from the work area, the very low levels of contamination, and the methods proposed to control emission dust during demolition and excavation. Potential short-term environmental impacts resulting from the implementation of Alternatives 2C, 3C.1, and 3C.2 include generation of fugitive dust, increased sediment in surface runoff, and disturbance and/or displacement of wildlife as a result of noise, dust, and human activity. Engineering controls would be used to minimize these potential short-term impacts.

In summary, Alternative 2C is favored over Alternatives 3C.1 and 3C.2. The short-term risks to the public and workers for constructing the on-property disposal facility would offset the increased risks to the public and workers associated with off-site transportation of the contaminated soils and debris.

Implementability. Alternatives 2C, 3C.1, and 3C.2 would all employ the same decontamination, demolition, and excavation operations. With the exception of the remotely controlled operations proposed for decontaminating

Silos 1, 2, and 3, all operations are standard construction activities which would be easily implemented. The remote silo decontamination operations would be used on the uncontaminated Silo 4 first to main improved worker familiarity with the operation processes and identify any potential operational difficulties.

Alternative 2C involves on-propaty disposal facility construction, which would employ standard construction services and materials. The off-site disposal alternatives (3C.1 and 3C.2) would involve standard transportation practices for radioactive materials. Alternatives 3C.1 and 3C.2 would be more administratively difficult to implement than Alternative 2C due to the coordination required with those states through which shipment would pass to the off-site locations. Additional efforts would be required to ensure that the Subunit C materials complied with criteria established by either the NTS or the permitted commercial disposal facility. Alternative 2C would require coordination with the State of Ohio to ensure that all technical requirements for the on-property disposal facility were met.

In summary, Alternative 2C is favored over Alternatives 3C.1 and 3C.2 based on relative overall implementability.

Cost. The estimated total present worth costs for Subunit C alternatives are provided in Table 8-2, and include a breakdown of capital and operating and maintenance cost.

Alternative 2C, which includes an on-property disposal, is the least expensive action alternative. Transportation to the NTS (Alternative 3C.1) or to a permitted commercial disposal facility (Alternative 3C.2) are both more expensive than constructing an on-property vault. However, the overall cost of disposal at a permitted commercial disposal facility is anticipated to be approximately 60 percent lower than the cost of disposal at a DOE-owned facility. This is primarily due to the packaging requirements of the DOE-owned facility. Tbe commercial disposal facility accepts bulk shipment of material.

8.2.3.3 Modifying Criteria

State Acceptance

The State of Ohio reviewed the preferred remedial alternative for Subunit C that was provided in the Proposed Plan, and concurs with the decision that the final disposition of the Subunit C contaminated soil and debris would be placed in abeyance to take full advantage of planned and in progress waste minimization treatment processes. Tbe contaminated soil and debris would either be processed through the selected Operable Unit 5 and Operable Unit 3 remedy identified by the respective Operable Unit 5 and Operable Unit 3 ROD or placed in interim storage to await the finalization of the disposal decisions for soils and debris under Operable Unit 5 and Operable Unit 3. For the sole purpose of evaluating the performance of an overall preferred remedial alternative for Operable Unit 4, the State of Ohio concurs with the identification of Alternative 2C as the preferred alternative for Subunit C.

Community Acceptance

DOE solicited input from the community on the preferred remedial alternative for Subunit C that was provided in the Proposed Plan. Verbal comments received during the public meeting indicated support of the chosen remedial alternative. Written comments received during the public comment period are addressed in the responsiveness summary (see Appendix C).

8.2.3.4 Subunit C Comparative Analysis Summary

Alternatives 2C and 3C.2 are relatively equal, as both would be cost-effective, and would provide overall protection of human health and the environment both in the short-term and the long-term. For evaluation purposes only, Alternative 2C has been identified as the preferred alternative for Subunit C. The decision regarding the final disposition of the Operable Unit 4 Subunit C contaminated soil and debris would be placed in abeyance to take full advantage of planned and in progress waste minimization treatment processes. The contaminated soil and debris would either be processed through the selected Operable Unit 5 and Operable Unit 3 remedy identified by the respective Operable Unit 5 and Operable Unit 3 ROD or placed in interim storage to await the finalization of the disposal decisions for soils and debris under Operable Unit 5 and Operable Unit

3.

9.0 SELECTED REMEDY

On the basis of the evaluation of final alternatives, the selected remedy to be used at Operable Unit 4 at the FEMP is a compilation of the selected alternatives from each subunit; i.e., Alternatives 3A.1/Vit - Removal, Vitrification, and Off-site Disposal - NTS; 3B.1/Vit - Removal, Vitrification, and Off-site Disposal - NTS; and 2C - Demolition, Removal and On-Property Disposal. The selected remedy will satisfy the requirements of both CERCLA and NEPA for the protection of human health and the environment; will comply with all regulatory requirements; will be cost-effective; will utilize permanent solutions to the maximum extent practicable; and will utilize treatment as a principal element of the response. The discussions presented here are based on the information used for detailed analysis of alternatives during the FS for Operable Unit 4. Actual methods used during the implementation of the remedy will be determined during detailed engineering design described in the remedial design and may differ from the descriptions provided below.

9.1 KEY COMPONENT'S

The major components of the selected remedy consist of the following:

- Removal of the contents of Silos 1, 2, and 3 (K-65 residues and cold metal oxides) and the decant sump tank sludge.
- Vitrification (glassification) to stabilize the residues and sludges removed from the silos and decant sump tant.
- Off-site shipment for disposal at the NTS of the vitrified contents of Silos 1, 2, 3, and the decant sump tank.
- Demolition of Silos 14 and decontamination of the gross and loose contamination, to the extent practicable, of the concrete rubble, piping, and other generated construction debris.
- Removal of the earthen berms and excavation of contaminated soils within the boundary of Operable Unit 4, to achieve proposed remediation levels. Placement of clean backfill following excavation (i.e. structure, foundations or large excavations which affect local topography).
- Segregation of non-contaminated soils, demolition of the vitrification treatment unit and associated facilities after use. Decontamination or recycling of debris prior to disposition.
- On-property interim storage of excavated contaminated soils and remaining contaminated debris in a manner consistent with the approved Work Plan for Removal Action 17 (improved storage of soil and debris).
- Continued access controls and maintenance, and monitoring of the stored wastes inventories.
- Institutional controls of the Operable Unit 4 area such as deed and land use restrictions.
- Potential additional treatment of stored Operable Unit 4 soil and debris using Operable Unit 3 and 5 waste treatment systems.
- Pumping and treatment of any contaminated perched groundwater encountered during remedial activities.
- Disposal of remaining Operable Unit 4 contaminated soils and debris consistent with the

selected remedies for Operable Units 5 and 3, respectively.

9.1.1 Removal of Silo 1, 2 and 3, and Decant Sump Tank Contents

The K-65 residues in Silos 1 and 2, the cold metal oxides in Silo 3, and the sludge in the decant sump tank will be removed. Approximately 6,796 m3 (8,890 yd3) of K-65 residues from Silos 1 and 2, 3,785 L (1,000 gallons) of sludge from the decant sump, and 3,890 m3 (5,088 yd3) of cold metal oxides from Silo 3 will be removed. The silos and the decant sump will be equipped with an off-gas treatment system(s) designed to handle radon emissions generated during removal.

9.1.2 Vitrification of Silo 1, 2 and 3, and Decant Sump Tank Contents

The major treatment component of the selected remedy consists of a vitrification system to stabilize the wastes from Silos 1, 2, and 3 and the decant sump tank. The wastes removed from the silos and the decant sump will be transferred to a vitrification processing facility which will be constructed on site. The wastes will be thickened as necessary for vitrification and then mixed with glass forming agents and placed into a vitrification melter. The vitrification process will convert the contents of the silos and the decant sump into a very durable glass form which is extremely resistant to the effects of time and weather. The process will destroy organic contaminants and the vitrified waste form will significantly reduce both the tendency of the waste to leach contaminants into the environment and the emission rate of radon gas. The direct radiation associated with the treated residues will remain relatively unchanged from the untreated form of the wastes. Off gases produced as a result of the high operating temperatures of the vitrification melter will be routed through an off-gas treatment system designed to remove solid particles and treat gaseous emissions such as radon. Treatability studies, conducted on a small scale as part of the RI/FS, indicate that the volume of vitrified material requiring disposal can be reduced by as much as 50 percent of the volume of untreated material removed from the silos and the decant sump.

9.1.3 Off-Site Shipment and Disposal of Treated Material

Approximately 2,770 m3 (3,623 yd3) of vitrified material from Silo 1 and 2 and the decant sump, along with approximately 1,471 m3 (1,923 yd3) of vitrified material from Silo 3, will be packaged and transported to the NTS for disposal.

The NTS is a DOE owned and operated disposal site located near Las Vegas, Nevada. The treated material will either be transported by rail to a destination near to or north of Las Vegas, Nevada or directly to the NTS by truck. If by rail, the waste containers carrying the treated material will be required to be transferred to trucks for transportation over roads to the NTS.

The NTS is located approximately 3,219 kilometers (km) [2,000 miles (mi)] from the FEMP. The FEMP has an approved NTS waste shipment and certification program, for low-level radioactive wastes, that is periodically audited by the NTS. Technical oversight of the waste management activities at the NTS is provided by the State of Nevada. This existing waste shipment disposal program will be modified and amended to indude the shipment and disposal of treated Operable Unit 4 wastes.

All off-site shipments will comply with the DOT regulations found in 49 CFR Parts 171 - 178 pertaining to transportation of hazardous and radioactive materials. Additionally, all the NTS waste acceptance requirements will be satisfied. The off-site transport of materials would also comply with the off-site acceptability requirements under CERCLA.

The remedy specifies off-site disposal of vitrified contents of Silos 1, 2 and 3 at the NTS. At the time of the signing of this ROD, the Department of Energy - Nevada Operations Office (DOE-NV) is in the process of preparing a Sitewide Environmental Impact Statement (EIS) under NEPA for the NTS. Shipments of waste generated from the cleanup of Operable Unit 4 are not proposed to begin until after the expected completion of the NTS site-wide EIS.

9.1.4 Demolition and Decontamination of Structures

Demolition of the silo structures will proceed with the systematic removal and dismantling of the Silos 1, 2, 3, and 4 domes, walls, floor slabs and footers. After removal of the silo contents and before Silos 1, 2, 3, and 4 are demolished, loose interior residues and loose concrete will be removed from the surfaces of the silos and transferred to the vitrification facility to be vitrified. Also, contaminated concrete from Silos 1 and 2, which exhibit highly elevated direct radiation fields, will be separated from the other Operable Unit 4 concrete and construction debris and prepared for processing in the vitrification facility. Contaminated piping, steel fencing, and other non-porous materials will be decontaminated to facilitate segregation for possible unrestricted release or disposal in a permitted commercial landfill. Only non-porous materials attaining the unrestricted use, free release criteria defined in DOE Order 5400.5 or any subsequent DOE order or amendment or final promulgated regulation addressing free release, will be released from the site as uncontaminated.

9.1.5 Demolition and Decontamination of Other Operable Unit 4 Structures

The existing RTS, Drum Handling Building pad, sump lift station foundation, concrete pipe trench, and decant sump tank will be removed and decontaminated. Additionally, all vitrification facilities constructed and equipment installed and used for the implementation of this remedy will be disassembled, decontaminated (if necessary), and dispositioned. Conventional decontamination and decommission techniques and equipment would be employed for these facilities. Uncontaminated materials attaining the unrestricted use, free release criteria defined in DOE Order 5400.5 will be released from the site for unrestricted use or for disposal in a commercial landfill.

9.1.6 Disposition of Demolished Structures and Debris

The selected remedy as defined under Alternative 2C specifies on-property disposal for Operable Unit 4 contaminated rubble and debris. However, this final action will be held in abeyance until a decision is reached in the Operable Unit 3 ROD for the final treatment and disposal of rubble and debris. The final decision on disposal of rubble and debris, generated from the demolition of the Operable Unit 4 silos and other facilities, will be determined as part of the ROD for Operable Unit 3. The Operable Unit 4 waste will be managed consistent with the disposal remedy put forth in the Operable Unit 3 ROD for contaminated rubble and debris. In the unlikely event unforeseen circumstances preclude the integration of Operable Unit 4 rubble and debris into the Operable Unit 3 treatment and disposal decision, the disposal decision for Operable Unit 4 rubble and debris will be documented in a ROD amendment for Operable Unit 4 in accordance with Section 117(c) of CERCLA and EPA guidance. The ROD amendment will provide the public and the EPA further opportunity to review and comment on the on-property disposal option for Operable Unit 4 rubble and debris. A ROD amendment to the Operable Unit 4 ROD will not be necessary in the event the Operable Unit 3 remedy for rubble and debris can be feasibly implemented by Operable Unit 4.

Holding action on the Operable Unit 4 on-property disposal decision in abeyance fosters an integrated site-wide disposal program for rubble and debris. The volume of rubble and debris to be generated from Operable Unit 4 is anticipated to be less than 1 percent of the volume expected to be generated site wide. The largest volume of rubble and debris from the site will be generated from Operable Unit 3, making it more appropriate to fully develop the on-property disposal option for rubble and debris through the Operable Unit 3 ROD. Additionally, Operable Unit 4 will be able to take advantage of any available waste minimization initiatives developed for rubble and debris which are identified in the Operable Unit 3 ROD.

Demolition and removal of Operable Unit 4 structures and facilities will proceed as described above. Operable Unit 4 rubble and debris will be dispositioned according to the selected remedy identified in the Operable Unit 3 ROD. Rubble and debris generated prior to finalization of the Operable Unit 3 ROD will be placed in interim storage to await finalization of the disposal decision for rubble and debris under Operable Unit 3. The design and management of interim storage facilities will be consistent with the approved Work Plan for FEMP Removal Action No. 17 - Improved Storage of Soil and Debris.

9.1.7 Soil Removal

After the silos are demolished, the surface and subsurface soils within the boundary of Operable Unit 4 will be excavated to attain required remediation levels for each of the constituents of concern. These soil remediation levels are considered preliminary until final soil remediation levels can be established through the Operable Unit 5 ROD. As indicated earlier, Operable Unit 5 has site-wide responsibility for soil cleanup. Also, the anticipated volume of soil to be removed from Operable Unit 4 will be less than 1 percent of the anticipated volume of soil to be remediated for the entire site. The surface and subsurface soils within Operable Unit 4 will be excavated to achieve the preliminary remediation levels presented and discussed in Section 9.2. These Operable Unit 4 soil remedial levels are based upon information available at the time of preparation of this ROD, from the Operable Unit 5 RI/FS. In the event that the Operable Unit 5 ROD determines that lower soil remediation levels are required, further remedial action will be conducted on the Operable Unit 4 residual soils to achieve the lower remediation levels for those COCs which are affected.

Soils exhibiting elevated direct radiation levels (i.e., potentially contaminated soils beneath Silos 1 and 2) will be segregated from other soils and transported to the vitrification facility for processing. Following excavation, the affected areas will be returned to original grade with the placement of clean backfill and revegetated to control erosion.

9.1.8 Soil Disposition

The selected remedy as defined under Alternative 2C specifies on-property disposal for Operable Unit 4 contaminated soils. However, this final action will be held in abeyance until a site-wide decision is reached in the Operable Unit 5 ROD for the final disposal of contaminated soils. The final decision on disposal of contaminated soils generated from Operable Unit 4 will be determined as part of the Record of Decision for Operable Unit 5. The Operable Unit 4 soils will be managed consistent with the disposal remedy put forth in the Operable Unit 5 ROD for contaminated soils. In the event unforeseen circumstances preclude the integration of Operable Unit 4 contaminated soils into the Operable Unit 5 disposal decision, the final disposal decision for Operable Unit 4 contaminated soils will be documented in a ROD amendment for Operable Unit 4 in accordance with Section 117(c) of CERCLA and EPA guidance. The ROD amendment will provide the public and the EPA further opportunity to review and comment on the final disposal option for Operable Unit 4 contaminated soils. A ROD amendment to the Operable Unit 4 ROD will not be necessary in the event the Operable Unit 5 remedy for contaminated soils can be feasibly implemented by Operable Unit 4.

Holding the Operable Unit 4 final disposal decision in abeyance fosters an integrated site-wide disposal approach for contaminated soils. The largest volume of contaminated soils from the site will be generated within Operable Unit 5, making it more appropriate to fully develop the final disposal option for contaminated soil tbrough the Operable Unit 5 ROD. Additionally, Operable Unit 4 will be able to take advantage of any applicable waste minimization initiatives developed for contaminated soils under the Operable Unit 5 ROD.

Excavation and removal of Operable Unit 4 contaminated soils will proceed as described above. Operable Unit 4 contaminated soils will be disposed in accordance with the selected remedy identified in the Operable Unit 5 ROD for soils. Contaminated soils generated prior to finalization of the Operable Unit 5 ROD will be placed in interim storage to await finalization of the disposal decision for contaminated soils under Operable Unit 5. The design and management of interim storage facilities will be consistent with the approved Work Plan for FEMP Removal Action No. 17 -

Improved Storage of Soil and Debris. The management of Operable Unit 4 contaminated soils will include measures to ensure future identification and retrieval of these wastes for final disposition.

Water Treatment

Wastewater generated as a result of this selected remedy along with water removed from the decant sump tank, Silo 4 (if any), and any contaminated perched water encountered during remediation will be treated at the FEMP wastewater treatment facility prior to discharge. In accordance with the Amended Consent Agreement, groundwater cleanup will be handled by Operable Unit 5. Operable Unit 4 would only handle the cleanup of perched water encountered during implementation of the selected remedy.

9.1.9 Cost

The total estimated present worth cost for the selected remedy is 91.7 million dollars. Table 9-1 summarizes the capital and the operating and maintenance costs. The total estimated present worth cost is less than the sum of the total costs of the preferred alternatives for Subunit A, B, and C. This is because Subunits A and B will share common costs for site preparation, construction of the silo contents removal work platform and processing facilities, and packaging and transportation.

9.2 SOIL CLEANUP CRITERIA

After the silos are demolished, the surface and subsurface soils within the Operable Unit 4 boundary will be excavated to attain required remediation levels for each of the constituents of concern. These soil remediation levels are preliminary until final soil remediation levels can be established through the Operable Unit 5 ROD. In the event that the Operable Unit 5 ROD determines that lower soil remediation levels are required, further remedial action will be conducted on the Operable Unit 4 residual soils to achieve the lower remediation levels for those COCs that are affected.

9.2.1 Land Use and Receptor Description

Preliminary remediation levels for soil cleanup were developed for an expanded trespasser receptor under a future land use with continued federal ownership to represent post remediation conditions at Operable Unit 4 and, therefore, provide the basis for establishing cleanup levels.

The future land use with continued federal ownership scenario represents a government reserve which remains under U.S. government control with no future development intended. Active access controls currently in place at the FEMP site (i.e. fencing, security access control, signs, etc.) will be discontinued, but the federal government will exercise the right to preclude site development through deed restrictions. This land use scenario was not included in the Baseline Risk Assessment. It was developed in a part of the FS for Operable Unit 4 to facilitate evaluation of long-term risks with continued land use restrictions. In addition to deed and land development restrictions, fences will be erected and equipped with signs posted to prohibit trespassing.

TABLE 9))1

COMBINED COST ESTIMATE FOR SELECTED REMEMDY

DESCRIPTION CAPITAL COSTS	DIRECT COST	INDIRECT COST	TOTAL COST
SITE PREPARATION	$768,600	$660,000	$1,428,600
WASTE PROCESSING	$1,695,800	$1,427,700	$3,123,500
VITRIFICATION EQUIPMENT	$2,935,500	$1,703,600	$4,639,100
HYDRAULIC/PNEUMATIC REMOVAL SYSTEM	$6,655,400	$14,068,800	$20,724,200
DEMOLITION & REMOVAL	$3,980,400	$5,977,000	$9,957,400
TRANSPORTATION		$1,915,000	$1,915,000
DISPOSAL	$2,360,200		$2,360,200
PACKAGING (3,694 PKGS. @ $995/PKG)	$975,200	$2,552,600	$3,527,800
DISPOSAL VAULT	$6,410,200	$10,914,800	$17,325,000
TOTAL CAPITAL	$27,696,300	$37,304,500	$65,000,800
RISK BUDGET	$3,046,600	$4,103,500	$7,150,100
SUBTOTAL	$30,742,900	$41,408,000	$72,150,900
CONTINGENCY (20.0%)	$6,148,600	$8,281,600	$14,430,200
TOTAL ESTIMATED INSTALLED COST	$36,891,500	$49,689,600	86,581,100
OPERATION AND MAINTENANCE (0&M) COSTS			
DURING CONSTRUCTION			$16,615,500
POST - REMEDIATION			$3,567,000
TOTAL PRESENT WORTH COST (CAPITAL AND 0&M @ 7%)			$91,738,000

The expanded trespasser receptor was developed to represent an adult and/or child that visits the site despite restrictions imposed under continued federal ownership. The possible activities of this receptor include hiking, roaming, bird watching, and other similar activities. An expanded trespasser may be exposed to Operable Unit 4 residual contaminants through the following pathways:

- Inhalation of fugitive dust, volatile organic compounds, and radon;
- Incidental ingestion of soil;
- Dermal contact with contaminants in soil; and
- External radiation exposure from radionuclides in soil.

9.2.2 Preliminary Remediation Levels

Tables 9-2 and 9-3 provide preliminary remediation levels for soil cleanup and the estimated risk to affected receptors from the residual contaminants left in the soils. Specific details on the development of these preliminary remediation levels are provided in the FS Report for Operable Unit 4.

As mentioned earlier, the future land use scenario for Operable Unit 4 will be as a government reserve with continued federal ownership. The on-property receptor of concern under this scenario will be an expanded trespasser. Cancer risks and chemical hazard to the expanded trespasser, from residual contaminants, are presented in Tables 9-2 and 9-3. For comparison, cancer risks and chemical hazard to an on-property farmer under a future land use scenario without federal ownership are also presented. Proposed remediation goals (PRGs), based on an ILCR of 10-6 and an HI of 0.2 were developed in the FS. These PRGs, presented in Tables 9-2 and 9-3 for the expanded trespasser, represent allowable incremental concentrations above background for these COCs based on targets of 10-6 incremental risk and hazard index of 0.2.

For radionuclide constituents of concern, the PRG was added to the background concentration to derive the preliminary remediation level. Based on the contaminant concentrations found in Operable Unit 4 soils, PRLs were not required for non-radionuclide contaminants as indicated in Table 9-3.

TABLE 9-2

PRELIMINARY REMEDIATION LEVELS IN SOILS - RADIONUCLIDES

Constituent of Concern	Expanded Trespasser 10-6 ILCR PRG pCi/g	Background (95th Percentile) pCi/g	ARAR Target pCi/g	Max. Detected Soil Concentration, pCi/g Level a Surface	Subsurface	Proposed Remediation pCi/g Levelb	ILCR above background to an Expanded Trespasser from Proposed Remediation
Pb-210 +2 progeny	77	1.33	NA	4.5	101	78	1.0x10-6
Ra-226 +5 progeny	0.37	1.45	5(top 6" soil) 15 (max. below 6")	88	206	2	1.0x10-6
Ra-228 +1 progeny	0.77	1.19	NA	0.48	1.24	2	1.0x10-6
Sr-90 +1 progeny	1420	ND	NA	1.8	0.8	NR	<1x10-6
Tc-99	38700	ND	NA	3.6	3.6	NR	<1x10-6
Th-228	0.4	1.43	NA	2.9	1.3	2	1.0x10-6
U-238 +2 progeny	59	1.22	NA	37	53	60	1.0x10-6

Notes:
a) Sum of background and PRG.
b) Includes the direct radiation, soil ingestion, and inhalation pathways.
NA Not Available
NR No Remediation Required

TABLE 9-3

PRELIMINARY REMEDIATION LEVELS IN SOILS - CHEMICALS

Constituent of Concern	Expanded Trespasser HI = 0.2 PRG mg/kg	Expanded Trespasser 10-6 ILCR PRG mg/kg	Background (95th percentile) mg/kg	ARAR Target mg/kg	Max. Detected Soil Concentration, mg/kg Surface	mg/kg Sub surface Levela	Proposed Remediation Levels	HI to an Expanded Trespasser from Proposed Remediation Levels	Risk to an Expanded Trespasser from Proposed Remediation
Antimony	31	N/A	7.7	NA	32	32	NR	0.2	N/A
Arsenic	510	23	8.45	NA	10	12	NR	N/A	<1x10-6
Barium	>10000	N/A	91.3	NA	112	142	NR	<.1	N/A
Cadmium	26	N/A	0.82	NA	6	7	NR	<.1	N/A
Chromium(III)	NA	N/A	15.5	NA	23	25	NR	<.1	N/A
Molybdenum	930	N/A	2.6	NA	25	30	NR	<.1	N/A
Nickel	8300	N/A	20.9	NA	39	39	NR	<.1	N/A
Silver	130	N/A	2.6	NA	10	18	NR	<.1	N/A
Thallium	31	N/A	0.58	NA	0.5	0.5	NR	<.1	N/A
Vanadium	1700	N/A	30.4	NA	28	33	NR	<.1	N/A
Zinc	>10000	N/A	62.2	NA	65	67	NR	<.1	N/A

Constituent of Concern	Expanded Trespasser HI = 0.2 PRG mg/kg	Expanded Trespasser 10-6 ILCR PRG mg/kg	Background (95th percentile) mg/kg	ARAR Target mg/kg	Max. Detected Soil Concentration, mg/kg		Proposed Remediation Levels mg/kg	HI to an Expanded Trespasser from Proposed Remediation Levels	Risk to an Expanded Trespasser from Proposed Remediation
					Surface	Sub surface Levela			
Benzo(a)anthracene	NA	61	ND	NA	4.7	ND	NR	N/A	<1x10-6
Benzo(a)pyrene	NA	8.8	ND	NA	5.2	ND	NR	N/A	<1x10-6
Benzo(b)fluoranthene	NA	72	ND	NA	9.7	ND	NR	N/A	<1x10-6
Chrysene	NA	2000	ND	NA	3.5	ND	NR	N/A	<1x10-6
Dibenzo(a,h)anthracene	NA	7.9	ND	NA	0.9	ND	NR	N/A	<1x10-6
Indeno(1,2,3-cd)pyrene	NA	32	ND	NA	4.2	ND	NR	N/A	<1x10-6

aIncludes the direct radiation, soil ingestion, and inhalation pathways.
NA = Not Available.
N/A = Not Applicable.
ND = Not Detected.
NR = No Remediation Required.

The clean-up levels presented in Tables 9-2 and 9-3 are preliminary. The development of final soil clean-up levels for Operable Unit 4 will be addressed in the Operable Unit 5 Record of Decision. These final clean-up levels will be consistent with the overall site approach for the development of soil clean-up levels as approved by the USEPA.

In those cases where a target concentration level specified by an ARAR is less than the proposed remedial level, the ARAR level was adopted as the remediation level. Remediation would be required for COCs that are present in the surface and subsurface soil at higher concentrations than the preliminary remediation level.

Based on the preliminary remediation levels, the COCs driving soil cleanup are Pb-210 and Ra-226. Soil remediation targeted at achieving the preliminary remediation levels for Pb-210 and Ra-226 will generate the largest volume of excavated soils.

9.3 MEASURES TO CONTROL ENVIRONMENTAL IMPACTS

All practical measures will be employed at the FEMP site to minimize environmental impacts during the implementation of the Operable Unit 4 Remedial Action. In accordance with DOE regulations for implementing the NEPA (10 CFR §1021), DOE has factored environmental impacts into the decision making process for the Operable Unit 4 Remedial Action.

Measures to control environmental impacts have been identified in the Operable Unit 4 FS/PP-DEIS and will be implemented during remedial design and remedial action to minimize impacts to on-property natural resources (e.g., wildlife and wildlife habitat, cultural resources, wetlands, surface water, groundwater). Operable Unit 4 remedial activities would not impact floodplain areas at the FEMP. The 100- and 500-year floodplain of Paddys Run is located near the silos and associated support facilities. Direct physical impact to the floodplain will not occur; however, the implementation of engineering controls will eliminate any indirect impact such as runoff and sediment deposition to the floodplain. Changes in flood elevation will not occur. The following provides a discussion of the measures that will be taken to minimize impacts to the environment on and adjacent to the FEMP Site.

Excavation activities and the construction and operation of the various support facilities (e.g., waste processing facility and storage facility) will result in the disturbance of 1.0 ha (2.5 acres) of terrestrial and managed field habitat and the potential for increased erosion and sediment loads to surface water i.e., Paddys Run. However, appropriate engineering controls such as silt fences, vegetative cover, and runoff control systems will be utilized to minimize runoff to Paddys Run and its associated aquatic habitat, including the state-threatened Sloan's crayfish (orconectes sloanii). In addition, appropriate High Efficiency Particulate Air (HEPA) filtration systems will be utilized during operation of the vitrification facility to minimize the potential for increased emissions to the ambient air and potential impacts to surrounding riparian habitat.

Groundwater, surface water, and air monitoring will be performed before, during, and after remedial activities. If adverse effects are detected in any of these environmental media, work will be immediately stopped until the effects are controlled and/or the appropriate response actions are executed.

The selected remedy for Operable Unit 4 includes the removal of the contaminated surface soil from the entire Operable Unit 4 Area and the replacement with clean fill material. Therefore, the primary residual contaminant would be uranium below the PRL in the subsurface soil. Because the contact of ecological receptors is limited (near background levels) to surface soil and surface waters, residual ecological risks associated with the Operable Unit 4 preferred alternative would be indistinguishable from those risks posed by background levels in the soil.

10.0 STATUTORY DETERMINATIONS

In accordance with the statutory requirements of Section 121 of CERCLA, as amended, remedial actions taken pursuant to Sections 104 and 106 must satisfy the following:

- Be protective of human health and the environment.

- Comply with all ARARs established under federal and state environmental laws (or justify a waiver).

- Be cost-effective.

- Utilize permanent solutions and alternative technologies or recovery technologies to the maximum extent practicable.

- Satisfy the statutory preference for remedies that utilize treatment and also significantly reduce the toxicity, mobility, and volume of the hazardous substances, pollutants, or contaminants.

In addition, CERCLA requires five year reviews to determine if adequate protection of human health and the environment is being maintained where remedial actions result in hazardous substances remaining on-site above health-based levels. A discussion is provided below on how the selected response actions for Operable Unit 4 satisfy these statutory requirements.

10.1 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The selected remedy achieves the requirement of being protective of human health and the environment by: (1) removing the sources of contamination, (2) treating and stabilizing the materials giving rise to the principal threats from Operable Unit 4, (3) disposing of treated materials at an off-site location which provides the appropriate level of protectiveness, and (4) remediating contaminated soils and debris to levels which are protective. The contents of Silos 1, 2, and 3 and the Decant Sump Tank will be removed and treated through a vitrification process and disposed at the NTS. Vitrification will stabilize these materials and inhibit leaching of contaminants to the environment when they are disposed. All silo structures and other facilities will be removed from Operable Unit 4 and disposed of in a manner consistent with the forthcoming ROD for Operable Unit 3. Contaminated soil will also be removed and disposed in a manner consistent with the Operable Unit 5 ROD.

Baseline cancer risks from current conditions exceed the 10-4 to 10-6 acceptable risk range. Under current conditions, the dominant risk is 5 x 10-3 to the trespassing child. Under the future land use scenario of continued federal ownership and the expanded trespasser receptor, the residual cancer risk from Operable Unit 4 will be reduced to less than 1 x 10-6. There are no short-term threats associated with the selected remedy that cannot be readily controlled. In addition, no adverse cross-media impacts are expected from the remedy.

10.2 COMPLIANCE WITH LEGALLY APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

In accordance with Section 121 of CERCLA, the selected remedy will achieve a standard or level of control consistent with all federal and State of Ohio ARARs and TBCs. The selected remedy will also be performed in accordance with all pertinent DOE Orders as well as other requirements. Appendix B provides a listing of the chemical-, action-, and location-specific ARARs and TBCs which are invoked by this remedy.

Removal, treatment by vitrification, and shipment for off-site disposal of silo material will be conducted in accordance with ARARs identified in this ROD. Disposition of rubble and debris from OU4 will be determined by the ROD for OU3, and will be conducted in accordance with the ARARs identified in that ROD; similarly, disposition of soils from OU4 will be determined by the ROD for OU5 and will be conducted in accordance with ARARs established in that ROD. Any interim storage of rubble and debris or soils, prior to final disposition under the RODs for OU3 and OU5, respectively, will be in accordance with ARARs identified in tbis OU4 ROD, pertinent DOE orders, and applicable site procedures.

Although RCRA is cited as an ARAR for remediation of Operable Unit 4, the silo residues destined for remediation are by-product material as defined under Section 11(e)(2) of the Atomic Energy Act of 1954, and as such, are excluded from RCRA regulation [40 CFR § 261.4(a)(4)]. By-product material, as defined by the AEA, includes tailings or wastes produced by the extraction or concentration of uranium and thorium from any ore processed primarily for its source material content (42 U.S.C. 2014).

Since the residues are excluded from regulation as solid or hazardous waste, the requirements under RCRA are not applicable to Operable Unit 4 remedial actions. However, analytical data from Silos 1, 2, and 3 material exceed toxicity characteristic levels for various toxicity characteristic metals under RCRA. Because the residues are sufficiently similar to hazardous waste regulated by RCRA and some RCRA requirements are appropriate for the circumstances of the release or potential release, certain substantive requirements of RCRA are relevant and appropriate for management of these residues, and are included in the table of ARARs.

10.3 COST EFFECTIVENESS

The selected remedial alternatives for each subunit have been determined to be protective of human health and the environment, and to be cost effective. The present worth cost for this remedy is 91.7 million dollars.

The off-site alternatives selected for the contents of Silos 1, 2, and 3 had a lower cost than the on-property disposal alternative for these materials. This is due to the fact that costs associated with construction of a facility that would provide the needed level of protection to human health and the environment from the silo contents would be greater due to the increased intruder protection requirements in the event of a trespasser. Also, the packaging and transportation costs associated with the vitrified material were lower than those for the cement stabilized material. Vitrification is more cost effective than cementation because the reduction in volume of vitrified product minimizes the amount of waste requiring handling, resulting in reduced transportation and disposal costs.

Conversely, transportation and disposal costs associated with disposing Operable Unit 4 soils and debris at NTS or a commercial facility are higher than the costs associated with construction of an engineered facility designed to manage the material on-property. Also, integration of the Operable Unit 4 disposal remedy for soils and debris with Operable Units 5 and 3 respectively, allows for economies of scale through treatment by processes developed for larger volumes of soil and debris.

10.4 UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES OR RESOURCE RECOVERY TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE

The EPA and the State of Ohio have determined that the selected remedy for Operable Unit 4 represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost effective manner. Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA, and the State of Ohio have determined that this selected remedy provides the best balance of tradeoffs among the alternatives in terms of long-term effectiveness and permanence, reduction in toxicity, mobility, and volume through treatment, short-term effectiveness, implementability, and cost. The selected remedies also meet the statutory preference for treatment as a principal element, and meet state and community acceptance.

Vitrification and off-site disposal will provide permanent treatment and volume reduction for the silo contents. By physically binding the contaminants into a glass-like matrix, the mobility of the contaminants and the emanation of radon gas would be greatly reduced. Vitrification will also significantly reduce the leachability of metal contaminants of concern to levels that are below RCRA regulatory thresholds. Vitrification will destroy any organic contaminants in the waste material due to the operating temperature of the treatment process. In addition, the treated material would be less than 50 percent of its original volume. As a result, the selected remedy would meet the CERCLA requirement for permanent solutions that reduce the toxicity, mobility, or volume through treatment.

Part of the remedy selected for contaminated soils and debris may also involve treatment of the waste material prior to disposal. The soil and debris will be placed into interim storage pending finalization of the disposal decision for these wastes through the RODs for Operable Units 3 and 5. This allows for the implementation of any applicable resource recovery technologies for these wastes, which are developed and included in the RODs for these operable units.

10.5 PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

By treating the contents of Silos 1, 2, and 3 in a vitrification process, and providing for treatment of contaminated debris and soils should treatment become the selected remedy for these wastes in the Operable Units 3 and 5 RODs, the selected remedy mitigates the principal threats posed by Operable Unit 4 through the use of treatment technologies. Therefore, the statutory preference for remedies that employ treatment as a principal element is satisfied.

10.6 UNAVOIDABLE ADVERSE IMPACTS

A number of unavoidable adverse impacts (Table 10-1) would occur when any of the action alternatives are implemented. As stated in the alternatives and in Table 10-1, many of these impacts would only be temporary. In addition, it should be noted that these impacts are presented for those remedial actions that will be implemented under the selected remedy. Those impacts associated with the final disposition of Subunit C material (soil and debris) will be identified and evaluated as part of the Records of Decision OUs 3 and 5.

TABLE 10-1 UNAVOIDABLE ADVERSE IMPACTS ON RESOURCES

Affected Resource	Impact Type
Soil and Geology	Soil at the FEMP site and the NTS would be disrupted by construction and excavation activities. Many impacts would be temporary, pending completion of remedial activities and restoration programs. The implementation of the selected remedy would temporarily disturb approximately 1.0 ha (2.5 acres) at the FEMP (e.g., excavation and construction). A permanent disruption of approximately 8 ha (20 acres) at the NTS would occur. All areas disturbed at the FEMP site would be regraded and revegetated. The regional geology of the FEMP site and surrounding area would not be affected by the selected remedy. Implementation of off-site disposal would not affect the regional geology of the NTS or surrounding areas.
Water Quality and Hydrology	Potential short-term impacts (e.g., release of sediment and fugitive on water quality and hydrology would be minimal regrading and revegetation around the silos to mimimize potential water quality impacts would occur. Assuming monitoring and maintenance activities continue at the NTS, no long-term impacts would be expected from waste disposal at the NTS.
Air Quality	Some temporary impacts to air quality at the FEMP site would result from fugitive dust emissions associated with construction and excavation activities (e.g., grading, compacting, loading). Lesser impacts would also be incurred from vehicle and equipment exhausts. These impacts are not expected to affect human health or the environment. No long-term impacts on air quality would be expected from activities associated with the selected remedy. Disturbed areas would be restored (e.g., regraded and revegetated) after completion of the remedial activities, thus minimizing the potential for the fugitive dust release. The off-site waste disposal facility would be designed to prohibit emission from stored waste. Only in the case of an accident during remedial actions would appreciable air quality impacts occur.
Biotic/Ecological Resources	Short-term disturbance of terrestrial, managed field, riparian and a habitat would be expected. Approximately 1.0 ha (2.5 acres) of habit at the FEMP site would be disturbed during excavation and construction activities. Habitat at the NTS is limited and it is believed little displacement of native species would occur.
Wetlands and Floodplains	Alternative 2C would not impact wetlands. Direct floodplain impacts resulting in a change of flood elevations would also not occur. Engineering controls would be implemented to minimize or eliminate indirect floodplain impacts. No wetlands or floodplains are present at the NTS.

TABLE 10-1
(Continued)

Affected Resource	Impact Type
Socioeconomics and Land Use	Minimal short-term impacts (e.g., increased traffic noise) to the socioeconomics and land use would occur. The long-term socioeconomic and land use impacts for the FEMP site would be positive because the waste would be isolated and controlled, thus no changes from current land use would be expected. Removing waste from the site would help to eliminate impacts on future populations and economic growth at the FEMP site. Disposal of this waste at the NTS would not be expected to impact socioeconomics or land use. Total present worth costs of the selected remedy is $91.7M. For this analysis, it is assumed that all resources required for remedial activities can be found within the thirteen county Consolidated Metropolitan Statistical Area (CMSA). The cumulative operating budget for the CMSA was approximately $805,000,000.00. The collectible revenue for the CMSA would increase up to approximately 11.4%.
Visual Resources	Construction and excavation activities would result in some minor incremental increases over the current visual and aesthetic impacts of the FEMP site. Short-term impacts would also be incurred at the NTS during construction, excavation, and transportation activities. The majority of impacts would be temporary and would cease following completion of remedial action activities and site restoration; however, aesthetic impacts would occur from the implementation of waste disposal facilities.
Noise	Ambient noise levels would temporarily increase as a result of construction, excavation, and transportation activities. All noise impacts would be temporary and would cease following completion of remedial activities.

10.7 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Implementing the selected remedy will result in permanent commitment of on-property land and associated natural resource services for material disposal at the FEMP site and off-site land at the NTS.

Soil at the FEMP site and the NTS will be disturbed by construction and excavation activities. Many impacts will be temporary, pending completion of remedial activities and restoration programs. The implementation of the selected remedy will temporarily disturb approximately 1.0 ha (2.5 acres) at the FEMP site. Furthermore, implementation of this remedy will permanently commit 8 ha (20 acres) at the NTS. All areas disturbed at the FEMP site will be regraded and revegetated.

Approximately 1.0 ha (2.5 acres) of habitat at the FEMP site will be disturbed during excavation and construction activities. Approximately 89 ha (220 acres) are expected to be permanently committed on a site-wide basis, with another twenty to thirty acres subject to temporary disturbances. It is assumed that processes such as revegetation and regrading are successful; however, the loss of habitat will result in a permanent displacement or loss of wildlife and associated services. Terrestrial habitat at the off-site disposal areas is limited, and little displacement of species is expected to occur.

Wetlands and associated natural resource services will not be injured by the selected remedy. Long-term direct impacts to the floodplain resulting in changes of flood elevations will not occur. Engineering controls would be implemented to minimize or eliminate any indirect impacts. There will be no impacts to wetlands or floodplains with disposal at the off-site disposal areas.

Consumptive use of geological resources (e.g., quarried rock, sand, and gravel) and petroleum products (e.g., diesel fuel and gasoline) will be required for removal, construction, and disposal activities of the selected remedy. Supplies of these materials will be provided by the construction contractor. Additional fuel use will result from off-site transport of the materials. However, adequate supplies are available without affecting local requirements for these products.

The treatment processes for the selected remedy will require the consumptive use of materials and energy. The vitrification process will be energy-intensive and require commitment of a considerable supply of electricity. Electricity can be obtained from the local utility.

Maintenance activities will be performed as necessary. Long-term environmental impacts would not be expected to occur from the Operable Unit 4 selected remedy. Monitoring and periodic site inspections would be performed to ensure long-term protection of human health and the environment.

11.0 DOCUMENTATION OF SIGNIFICANT CHANGES

The FS/PP-DEIS for Operable Unit 4 was released for public comment in March 1994. The DOE reviewed all written and oral comments submitted during the public comment period. Upon review of these comments, it was determined that no significant changes to the remedy, as was originally identified in the FS/PP-DEIS, were necessary. However, it should be noted that the repromulgation of 40 CFR §191 by the EPA, did result in minor changes in the comparative analysis of alternatives presented in the FS/PP-DEIS. The following discussion addresses the nature and extent of these changes.

11.1 REPROMULGATION OF 40 CFR §191

Repromulgation of the 40 CFR §191 requirements for Management and Disposal of Spent Nuclear Fuel, High-Level, and Transuranic Wastes has caused changes to be made to the ARARs as described in the Draft Final FS/PP-DEIS, conditionally approved by the EPA on February 9, 1994. DOE chooses not to submit revision pages to the FS/PP-DEIS; all changes to the ARARs for that document and any impacts from the repromulgation are discussed in this section of the ROD. Since the repromulgation resulted in relevant and appropriate, rather than applicable requirements, the repromulgation of 40 CFR §191 will not impact the proposed off-site alternative for disposition of the K-65 material. However, the on-property disposal alternatives (Alternatives 2A/Vit and 2A/Cem) that were previously retained, having passed the threshold criteria of the detailed analysis, are no longer able to meet the threshold criteria of compliance with ARARs, and are consequently dropped from further consideration. Subsequently, all references to Alternative 2A are therefore deleted from reference in the text of the ROD, and in Appendix A.

The only relevant and appropriate requirement from 40 CFR §191 that is retained as an ARAR in this ROD (Appendices A and B) for the proposed alternative is 40 CFR §191.03(b), which establishes dose limits for management and storage of the K-65 material. However, since this ARAR is relevant and appropriate, rather than applicable, it will pertain only to the on-property portions of the remedial activities conducted under this action.

11.1.1 Background

The United States Department of Energy - Fernald Field Office (DOE-FN) received conditional approval of the Draft Final FS/PP-DEIS for Operable Unit 4 from USEPA on February 9, 1994. Included in the FS/PP-DEIS applicable or relevant and appropriate requirements (ARARs) was a reference to 40 CFR §191, "Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level, and Transuranic Wastes". This reference to 40 CFR §191 was modified in the Operable Unit 4 FS/PP-DEIS, submitted in February 1994 in response to the conditional approval letter, to reflect the changes to the regulation that occurred upon its repromulgation on December 20, 1993. It still accommodates the specific direction previously provided by the USEPA regarding incorporation of the 40 CFR §191 requirements as an ARAR/TBC ("Operable Unit 4 Screening Dispute Resolution U.S. DOE Fernald", Catherine McCord, USEPA, to Andy Avel, DOE, dated October 18, 1990). The final rule became effective on January 19, 1994, during final revision of the Operable Unit 4 FS/PP-DEIS, and agency comments did not address the repromulgation of the rule. This fact was discussed with the USEPA, and a DOE position paper on the incorporation of 40 CFR §191 as an ARAR for Operable Unit 4 remediation was submitted to the USEPA for concurrence. The USEPA disagreed with the draft position proposed by DOE, and responded with a directive to incorporate the substantive elements of the repromulgated rule into the ROD, with an option to resubmit change pages to the FS/PP-DEIS ("Application of 40 CFR §191 to OU #4", Jim Saric, USEPA, to Jack Craig, DOE, dated April 25, 1994). DOE elected not to revise the FS/PP-DEIS, but rather to describe in this section of the ROD changes to the table of ARARs and associated impacts on selection or implementation of remedial alternatives that have occurred between the time the Draft Final FS/PP-DEIS was conditionally approved, and the submittal of the ROD to the USEPA and OEPA. The list of ARARs in the ROD, and proposed approach to compliance with the substantive elements thereof, once approval by the USEPA is obtained, will be the final approved list of applicable or relevant and appropriate requirements for final remediation of Operable Unit 4.

11.1.2 Impacts of Repromulgation

Since 40 CFR §191 cannot be considered a legally "applicable" class of ARAR for this CERCLA remediation, §191 is not applicable to any Operable Unit 4 waste streams. Since compliance with only applicable requirements is required to be demonstrated for off-site remedial alternatives proposed under CERCLA, these requirements will not impact the proposed off-site alternative for disposal of the treated K-65 material at the NTS.

DOE previously included 40 CFR §6191 Subpart A as a relevant and appropriate requirement, and Subpart B as to be considered (TBC) criteria for management of K-65 material in accordance with guidance received from the USEPA. Subpart A of §191, entitled "Environmental Standards for Management and Storage" includes public dose rate standards for protection of the public from radiation hazards posed by spent nuclear fuel, high-level, or transuranic waste material. The repromulgation of the Final Rule did not materially affect the sections of Subpart A referenced in the Operable Unit 4 FS/PP-DEIS; the Subpart A requirement referenced in the Operable Unit 4 FS/PP-DEIS remains unchanged in the table of ARARs as a relevant and appropriate requirement for the on-property portion of the remedial activities to be conducted on the K-65 material.

Prior to repromulgation, Subpart B requirements were in remand, and were therefore considered TBCs in the FS/PP-DEIS submitted to the agencies. Since Subpart B of §191, entitled "Environmental Standards for Disposal", has been repromulgated, the USEPA has directed that sections must now be considered as relevant and appropriate requirements for any on-property disposal alternatives. Since it could not be demonstrated that the on-property disposal of treated K-65 material would comply with specific requirements of this Subpart, those alternatives involving on-property disposal (Alternatives 2A/Vit and 2A/Cem) were no longer able to meet the threshold criteria of compliance with these ARARs, and were consequendy dropped from further consideration. All descriptions to Alternative 2A are therefore deleted from reference in the text of the ROD, and in Appendix A.

A new Subpart C of §191 "Environmental Standards for Groundwater Protection", was created by the repromulgated rule. As with Subpart B, this new Subpart pertains only to disposal systems. The elements of this Subpart must now be considered as relevant and appropriate requirements; however, since the on-property disposal alternatives to which this Subpart pertains were dropped from further consideration on the basis of non-compliance with Subpart B requirements, and since Subpart C will not pertain to any off-site disposal alternatives, these requirements will not be included in the Appendix A or B tables of ARARs. Subpart C will therefore have no effect on the selected alternative, which includes off-site disposal.

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APPENDIX A

SUMMARY OF MAJOR ARARs FOR OPERABLE UNIT 4
REMEDIAL ACTION ALTERNATIVES

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ACRONYMS

ALARA	As Low As Reasonably Achievable
ARAR	Applicable or Relevant and Appropriate Requirements
AWWT	Advanced Waste Water Treatment Facility
CAMU	Corrective Action Management Unit
CFR	Code of Federal Regulation
DOE	United States Department of Energy
FEMP	Fernald Environmental Management Project
HEPA	High-Efficiency Particulate Air (filter)
HLRW	High Level Radioactive Waste
m	meter
MCL	Maximum contaminant level
MCLG	Maximum contaminant level goal
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
OAC	Ohio Administrative Code
ORC	Ohio Revised Code
OU4	Operable Unit 4
pCi	picoCuries
psi/l	picoCuries per liter
$pCi/m^2/s^2$	picoCuries per square meter per second
RCRA	Resource Conservation and Recovery Act
SWMU	Solid Waste Management Unit
TBC	to be considered
TRU	Transuranic
TSD	Treatment, Storage, or Disposal Facility
TU	Temporary Unit

UMTRCA	Uranium Mill Tailings Radiation Control Act
WWTS	Waste Water Treatment System

A.1.0 INTRODUCTION

This appendix presents a summary of the key Applicable or Relevant and Appropriate Requirements (ARARs) and to be considered (TBCs) which pertain to the remedial alternatives which were retained in the Detailed Analysis of Alternatives (Section 4) of the Feasibility Study Report for Operable Unit 4, and described in Section 7 of the Record of Decision. This table includes ARARs established under federal and state environmental laws, and TBC criteria which were determined to be necessary to ensure protection of human health and the environment.

The appendix has three tables in accordance with the three types of ARARs: Chemical-Specific, Location-Specific, and Action-Specific. The layout of the tables is as follows: the retained alternatives are listed in the first column, followed by the regulatory citation and classification as applicable, relevant and appropriate, or TBC. Next the basis for selection and determination of the class of ARAR is described, followed finally by the strategy for compliance with the ARAR during implementation of the alternative. This format and contained information is consistent with the United States Environmental Protection Agency (EPA) Interim Final Guidance on Preparing Superfund Decision Documents: the Proposed Plan, Record of Decision, Explanation of Significant Differences, and Record of Decision Amendment (OERR; EPA/540/G-89/007, July 1989b).

Summary tables listing all the ARARs/TBCs specifically identified for the selected remedy are provided in Appendix B. A detailed listing, and discussion of compliance with ARARs is provided in Appendix F of the Feasibility Study Report for Operable Unit 4.

TABLE A.1-1

SUMMARY OF MAJOR ARARs FOR OPERABLE UNIT 4 REMEDIAL ACTION ALTERNATIVES

Chemical-Specific

Alternative Number	Regulatory Title And Citation	ARAR/TBC	Rationale for Determination as ARAR/TBC	Basis for Compliance
2B, 4B 2C	Inorganic Chemicals in Drinking Water 40 CFR § 141.11, 40CFR § 141.15, 40 CFR § 141.16, 40 CFR § 141.51, and 40 CFR § 141.62 and 143.3 (OAC 3745-81-11,3745-81-15, and 3745-81-16)	Relevant and Appropriate	These requirement are not applicable since no public water system (as defined in 40 CFR § 141) is involved. They are relevant and appropriate to protecting drinking water sources from the same contaminants found in the operable unit. These contaminants might migrate or leach into the MCLGs. underlying aquifer as a consequence of various alternatives.	Fate and transport modeling, for the proposed disposal facility, predicts that potential future releases to the aquifer from the facility will not exceed MCLs or This is primarily due to the presence of approximately 9 in (30 ft) of low hydraulic conductivity glacial till, that has no significant hydrologic connections with the underlying aquifer, beneath the proposed disposal facility.

TABLE A.1-1
(Continued)

2B, 4B 2C 40 CFR § 141.61 (OAC 3745-81-12)	Organic Chemicals in Drinking Water	Relevant and Appropriate	The requirement is not applicable since no public water system (as defined in 40 CFR§ 141) is involved. it is relevant and appropriate to protect drinking water sources from the same contaminants found in the operable unit. These contaminants might migrate or leach into the underlying aquifer as a consequence of remedial actions.	Fate and transport modeling, for the proposed disposal facility, predicts that potential future releases to the aquifer from the facility will not exceed MCLs. This is primarily due to the presence of approximately 9 m (30 ft) of low hydraulic conductivity glacial till, that has no significant hydrologic connections with the underlying aquifer, beneath the proposed disposal facility.
3A.1 2B, 3B.1, 4B 2C, 3C.1 40 3C.2	Radionuclide Emissions (Except Airborne Radon-222) CFR § 61, Subpart H	Applicable	Radioactive materials within this operable unit might contribute to the dose to members of the public from the air pathway during implementation of remedial actions. This requirement is applicable to remedial actions implemented in Operable Unit 4, since NESHAP applies to operating units.	The pollution control equipment for the silos and treatment system for off-gas emissions will be designed to limit the discharge of radionuclides to acceptable levels.

TABLE A.1-1
(Continued)

Alternative Number	Regulatory Title and Citation	ARAR/TBC	Rationale for Determination as ARAR/TBC	Basis for Compliance
3A.1 2B, 3B.1, 4B 2C	Radon-222 Emissions 40 CFR § 61 Subpart Q	Applicable	Facilities such as the silos within this operable unit might qualify as sources since they might contain radium-226 in sufficient concentrations to emit radon-222. This requirement is applicable only to storage and disposal of radium-bearing material.	The radon-222 flux rate standard of 20 pCi/m2/s would be met during storage and/or disposal. This is due to the presence of a bentonite layer in the silos (prior to treatment), and the stabilized nature of the treated waste.
2B, 4B 2C	Standards for Control of Residual Radioactive Material 40 CFR § 192, Subpart A 40 CFR § 192.02(b)	Relevant and Apropriate	Radioactive materials in this operable unit are residual radioactive material from uranium processing. However, the FEMP site is not an ore processing site designated under the UMTRCA; therefore, management of these residues is relevant and appropriate under this regulation.	Radon-222 emissions would comply with the 20 pCi/m2/s release flux rate and the 0.5 pCi/L concentration above background at the disposal site boundary. This is due to the presence of a bentonite layer in the disposal cell, and the stabilized nature of the treated waste.

TABLE A.1-2

SUMMARY OF MAJOR ARARs FOR OPERABLE UNIT 4 REMEDIAL ACTION ALTERNATIVES

Location-Specific

Alternative Number	Regulatory Title and Citation	ARAR/TBC	Rationale for Determination as ARAR/TBC	Basis for Compliance
2B, 4B 2C	Solid, Nonhazardous Waste Disposal Facility Design Considerations OAC 3745-27-07	Relevant and Appropriate	The State of Ohio solid waste rules are relevant and appropriate to the disposal of silo residues, demolition debris, and other solid wastes generated by the implementation of a remedial alternative within a CAMU. Creation of a solid waste landfill requires that the technical location requirements of the State of Ohio be satisfied. On-site disposal alternatives might trigger this part of the Ohio requirements, which are more stringent than the federal counterparts. The FEMP site is over a sole source aquifer as defined in OAC 3745-27-07. An exemption to this prohibition by demonstration of compliance with the technical criteria in this rule is permitted under ORC 3734.02(G).	The proposed disposal vault meets the technical considerations used to grant exemptions: approximately 9 m (30 ft) of low hydraulic conductivity glacial till lies beneath the proposed liner, saturated zones in the glacial till have no significant hydrologic connections with the underlying aquifer, and fate and transport modeling predicts that potential future releases to the aquifer from the facility will not adversely impact human health or safety or the environment.
3A.1 2B, 3B.1, 4B 2C, 3C.1, 3C.2	Compliance Floodplain/Wetlands Environmental Review Requirements 10 CFR § 1022 (Executive Order 11990)	Applicable	This requirement is applicable because the FEMP is a DOE facility subject to the NEPA requirements for environmental activities at federal facilities. Several alternatives might result in destruction or modification of wetland areas.	These alternatives would comply with all NEPA evaluation and documentation requirements. NEPA documentation will also specify public notice requirements, wetland assessments, and any mitigative measures that may be required.

TABLE A.1-3

SUMMARY OF MAJOR ARARs FOR OPERABLE UNIT 4 REMEDIAL ACTION ALTERNATIVES

Action-Specific

Alternative Number	Regulatory Title and Citation	ARAR/TBC	Rationale for Determination as ARAR/TBC	Basis for Compliance
3A.1 2B, 3B.1, 4B 2C, 3C.1, 3C.2	Treatment, Storage, or Disposal Facility (General Standards) 40 CFR § 264, Subpart B (OAC 3745-54-13 through 16)	Relevant and Appropriate	Residues, which exhibit a charateristic similar to RCRA hazardous waste, removed from this operable unit might be treated, stored, and disposed in accordance with TSD facility standards.	These alternatives would undertake actions to comply with the TSD Facility general standards.
2B, 4B 2C	Releases from Solid Waste Management Units 40 CFR § 264, Subpart F OAC 3745-54-91 through 99; and OAC 3745-5501 through 011)	Relevant and Appropriate	This requirement is relevant and appropriate because the residues stored in the silos are sufficiently similar to hazardous waste.	These alternatives would install monitoring wells to comply with the groundwater monitoring requirements.
3A.1 2B, 3B.1, 4B 2C, 3C.1, 3C.2	Closure 40 CFR § 264, Subpart G 40 CFR § 264.111, .114, and .116 (OAC 3745-55-11, -14, and -16)	Relevant and Appropriate	These requirements are relevant and appropriate because the residues are sufficiently similar to hazardous waste and the remedial alternatives might require closure of units used to manage waste materials.	These alternatives would design, construct, operate, and monitor the disposal facility to meet the closure performance standard; decontaminate all equipment used in closure, and file a survey plot showing location of disposal facility.

TABLE A.1-3
(Continued)

2B, 4B 2C	Post-Closure 40 CFR § 264.117 (OAC 3745-55-17) 40 CFR § 264.119 (OAC 3745-55-19)	Relevant and Appropriate	These requirements are relevant and appropriate because the residues are sufficiently similar to hazardous waste and some remedial alternatives might leave residues in place.	These alternatives would comply with the post-closure requirements for units involved in disposal, including continued monitoring, access controls, and deed restrictions.
3.A1 2B, 3B.1, 4B 2C, 3C.1, 3C.2 I	Container Storage 40 CFR § 264.171 - 178 Subpart (OAC 3745-55-71 through -78)	Relevant and Appropriate	These requirements pertain to alternative utilizing containers for storage, or treatment of hazardous waste in containment buildings. The requirements are relevant and appropriate because the residues in the silos are sufficiently similar to hazardous waste.	These alternatives would take measures to comply with the hazardous waste container requirements.

TABLE A.1-3
(Continued)

Alternative Number	Regulatory Title and Citation	ARAR/TBC	Rationale for Determination as ARAR/TBC	Basis for Compliance
3A.1 2B, 3B.1	Tank Systems 40 CFR § 264, Subpart J (OAC 3745-55-91 throught 96)	Relevant and Appropriate	These requirements pertain to alternative utilizing treatment or storage in a tank. These requirements are relevant and appropriate because the residues in the silos are sufficiently similar to hazardous waste.	All process tanks will be constructed with durable material that is compatible with the waste and treatment process for which the tank is designed. The tank design will include secondary containment capable of detecting and collecting releases. Approved inspection and maintenance procedures, which include scheduled visual inspection of all tanks will be established prior to management of waste in the tanks.
2B, 4B 2C	Landfill Capping 40 CFR § 264.310 (OAC 3745-57-10)	Relevant and Appropriate	Land disposal of hazardous waste constitutes closure as a landfill, which requires a cap to prevent migration of waste constituents due to leaching. This requirement is relevant and appropriate because the residues are sufficiently similar to hazardous wastes.	Compliance would be achieved through proper design, construction, and implementation of institutional controls at the disposal vault. These controls would include continued inspection, monitoring, and maintenance of the disposal facility and surveyed benchmarks.

TABLE A.1-3
(Continued)

Alternative Number	Regulatory Title and Citation	ARAR/TBC	Rationale for Determination as ARAR/TBC	Basis for Compliance
3A.1 2B, 3B.1, 4B 2C, 3C.1, 3C.2	Corrective Action for SWMUs (CAMU and TU) 40 CFR §, Subpart S 40 CFR § 264.552-.553	Relevant and Appropriate	During the process of remediation, waste materials might require management in or consolidation in land based units for the purpose of staging, treating or disposing the material. All of the materials generated from remediation of Operable Unit 4 are considered remediation wastes, amenable to management under this requirement. Some of the waste material might exhibit a RCRA characteristic, or otherwise be sufficiently similiar to hazardous waste to make this requirement relevant and appropriate.	These alternatives would demonstrate they can meet the seven criteria required for use of a CAMU, and would use only tanks or containers as temporary units.
3A.1 2B, 3B.1, 4B 2C, 3C.1, 3C.2	Radiation Dose Limit (All Pathways) DOE Order 5400.5, Chapter II, Section 1.a	To be considered	Radiation sources within this operable unit might contribute to the total dose to members of the public from this DOE facility. This requirement establishes limits for allowable exposure of the public to radiation sources from all pathways as a result of routine DOE activities. It is included as TBC to ensure adequate protection of human health and the environment from sources of radioactivity.	Where appropriate, the treatment facility design will include HEPA filters to control radioactive particulate emissions. Excavations, excavated soil, and other sources of particulate emissions will be controlled, as appropriate, through good construction practices. Releases to water will be controlled by design and operation of secondary containment features and treatment in the FEMP WWTS and AWWT. Treatment of the waste source will reduce contributions to dose from radon gas, and reduce the likelihood of migration of radionuclides.

TABLE A.1-3
(Continued)

Alternative Number	Regulatory Title and Citation	ARAR/TBC	Rationale for Determination as ARAR/TBC	Basis for Compliance
3A.1	Environmental Radiation Protection Standards for Mgt. and Disposal of HLRW, Spent Nuclear Fuel, and TRU Wastes 40 CFR § 191, Subpart A 40 CFR § 191.03(b)	Relevant and Appropriate	As directed by the U.S. EPA letter, "Applicable of 40 CFR § 191 to OU4", Jim Saric, U.S. EPA to Jack Craig, DOE, dated April 25, 1994.	This requirement would be met through the use of treatment for waste stabilization and management and storage of vitrified material prior to off-site disposal in accordance with ALARA concepts, proper engineering design, and the use of administrative controls.
3A.1 2B, 3B.1, 4B 2C, 3C.1, 3C.2	NEPA Implementation 10 CFR § 1021.2	Applicable	This requirement is applicable because the FEMP is a DOE facility, subject to NEPA evaluation for specific actions at DOE facilities.	NEPA evaluations and documentation will be prepared for the selected remedial alternatives in accordance with established site procedures.

TABLE A.1-3
(Continued)

Alternative Number	Regulatory Tide and Citation	ARAR/TBC	Rationale for Determination as ARAR/TBC	Basis for Compliance
2B, 4B 2C	Standards for Control of Residual Radioactive Material 40 CFR § 192, Subpart A 40 CFR § 192.02(a)	Relevant and Appropriate	Radioactive materials in this operable unit are residual radioactive material from uranium processing. However, the FEMP site is not on ore processing site designated under the UMTRCA; therefore, management of these residues is relevant and appropriate under this regulation.	Treatment of the waste and disposal in a properly designed disposal facility will control residuals for 200-1000 years.
2C, 3C.1, 3C.2	Standards for Cleanup of Lands Contaminated with Residual Radioactive Materials 40 CFR § 192, Subpart B 40 CFR § 192.12(a)	Relevant and Appropriate	Radioactive materials in this operable unit are residual radioactive material from uranium processing. However, the FEMP site is not on ore processing site designated under the UMTRCA; therefore, management of these residues is relevant and appropriate under this regulation.	This requirement would be met by removing contaminated soil down to required levels, and disposal of the residues in an engineered vault with a 3 m (10 ft) thick multimedia cover.
3A.1, 2B 3B.1, 4B, 2C 3C.1, 3C.2	Implementation of Health and Environmental Protection Standards for Uranium Mill Tailings 40 CFR § 192, Subpart C	Relevant and Appropriate	Radioactive materials in this operable unit are residual radioactive material from uranium processing. However, the FEMP site is not on ore processing site designated under the UMTRCA; therefore, management of these residues is relevant and appropriate under this regulation.	These alternatives would use this guidance during implementation.

APPENDIX B

SUMMARY OF ARARS FOR THE OPERABLE UNIT 4 REMEDIAL ACTION

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LIST OF ACRONYMS

A	Applicable
AEA	Atomic Energy Act
ARAR	Applicable or Relevant and Appropriate Requirements
CAA	Clean Air Act
CAMU	Corrective Action Management Unit
CFR	Code of Federal Regulation
CWA	Clean Water Act
DCG	Derived Concentration Guide
DOE	United States Department of Energy
EDE	Effective Dose Equivalent
HLRW	High Level Radioactive Waste
NEPA	National Environmental Policy Act
OAC	Ohio Administrative Code
ORC	Ohio Revised Code
pCi/l	picoCuries per liter
$pCi/m^2/s^2$	picoCuries per square meter per second
R&A	Relevant and Appropriate
RCRA	Resource Conservation and Recovery Act
SDWA	Safe Drinking Water Act
SWMU	Solid Waste Management Unit
TBC	to be considered
TSD	Treatment, Storage, or Disposal Facility
TU	Temporary Unit
UMTRCA	Uranium Mill Tailings Radiation Control Act

B.1.0 INTRODUCTION

Appendix B presents a summary of ARARs/TBCs associated with the remedial action alternatives selected for Operable Unit 4. These tables group the ARARs/TBCs according to type (i.e., Chemical-specific, Location-specific, and Action-specific) and by the governing regulatory act (e.g., CAA, CWA, RCRA, etc.). The tables identify all selected remedial alternatives associated with the regulatory requirement, a brief description of the requirement, and the classification of the ARAR/TBC.

It will be noted that several ARARs identified for the selected alternative include requirements that pertain to siting or operation of an on-site disposal facility for debris, rubble, or soils from remediation of OU4 (referenced as Alternative 2C in the tables). Disposition of rubble and debris (e.g., from demolition of the silos) from OU4 will be conducted in accordance with the ARARs identified in the ROD for OU3; disposition of soils from OU4 will be in accordance with ARARs established in the ROD for OU5. Any interim storage of soils, rubble, or debris prior to final disposition under the RODs for OU3 and OU5 will be in accordance with ARARs identified in this ROD, as well as pertinent DOE orders and applicable site procedures.

TABLE B.1-1
SUMMARY OF ARARS FOR OPERABLE UNIT 4 SELECTED REMEDIAL ACTION ALTERNATIVES
Chemical-Specific

Regulatory Alternative	Program	Regulatory Title and Citation	Regulatory Description	ARAR/TBC
3A.1 Vit 3B.1 Vit 2C	CAA	Radionuclide Emissions (Except Airbome Radon-222) 40 CFR§ 61, Subpart H	Operating units shall establish procedures to prevent a member of the public from receiving an EDE of 10 mrem per year.	A
3A.1 Vit 3B.1 Vit 2C	CAA	Radon-222 Emissions 40 CFR§ 61, Subpart Q	Storage and disposal activities for radimn-bearing by-product material shall establish measures to ensure emissions of radon are maintained below 20 pCi/m2/s.	A
3A.1 Vit 3B.1 Vit 2C	CWA	Ohio Water Quality Standards (Five Freedoms of Surface Waters) OAC 3745-1-04	Establishes requirements for maintaining integrity and useability of surface water.	R&A
3A.1 Vit 3B.1 Vit 2C	CWA	Ohio Water Quality Standards OAC 3745-1-07	Establishes allowable limits on discharges or releases to Paddys Run and the Great Miami River.	A
2C	RCRA Sub. D	Chemicals in Drinking Water (Solid Waste Disposal Facility) 40 CFR§ 257.3-4 [OAC 3745-27-10(D)]	Establishes requirements to protect underground drinking water sources from operation of the proposed disposal facility for Subunit C material.	R&A
2C	RCRA Sub. C	Chemicals in Drinking Water (Hazardous Waste Disposal Facility) 40 CFR§ 264.94 (OAC 3745-5094)	Establishes requirements to assure groundwater concentrations of hazardous constituents do not exceed regulatory levels due to operation of the proposed disposal facility for Subunit C material.	R&A
2C	SDWA	Inorganic Chemicals in Drinking Water 40 CFR§ 141.11 40 CFR§ 141.15,	Establishes requirements to assure protection of drinking water sources from inorganic contaminants.	R&A

Regulatory Alternative	Program	Regulatory Title and Citation	Regulatory Description	ARAR/TBC
		141.16, 141.51, 141.62 and 143.3 (OAC 3745-81-11, OAC 3745-81-15, and OAC 3745-81-16)		
2C	SDWA	Organic Chemicals in Drinking Water 40 CFR§ 141.61 (OAC 3745-81-12)	Establishes requirements to assure protection of drinking water sources from organic contaminants.	R&A
2C	UMTRCA	Standards for Control of Residual Radioactive Material 40 CFR§ 192.02 (b)	Establishes standards for managing residual radioactive material from inactive uranium processing sites so the average release rate of radon-222 does not exceed 20 pCi/m2/s or the average concentration in air outside facility boundary does not exceed 0.5 pCi/L above background following remediation activities.	R&A
3A.1 Vit 3B.1 Vit 2C	DOE	Radiation Protection of the Public and the Environment (DCGs for Water) DOE Order 5400.5 Chapter III	Establishes allowable residual concentrations of radicouclides in water. Included as TBC to ensure adequate protection of human health and the environment from sources of radioactivity.	TBC
3A.1 Vit 3B.1 Vit 2C	DOE	Radiation Protection of the Public and the Environment (DCGs for Air) DOE Order 5400.5 Chapter III	Establishes allowable residual concentrations of radionuclides in air. Included as TBC to ensure adequate protection of human health and the environment from sources of radioactivity.	TBC
3A.1 Vit 3B.1 Vit 2C	DOE	Residual Radioactive Material (Interim Storage) DOE Order 5400.5 Chapter IV 6.b	Establishes allowable coocentrations of radon-222 in air during interim storage of waste material. Included as TBC to ensure adequate protection of human health and the environment from sources of radioactivity.	TBC

TABLE B.1-2

SUMMARY OF ARARS EOR OPERABLE UNIT 4 SELECTED REMEDIAL ACTION ALTERNATIVES

Location-Specific

Regulatory Alternative	Program	Regulatory Title and Citation	Regulatory Description	ARAR/TBC
3A.1 Vit 3B.1 Vit 2C	NEPA/ DOE	Compliance with Floodplains/Wetlands Environmental Review Requirements 10 CFR§ 1022 (Executive Order 11990)	Establishes requirements for DOE to evaluate potential adverse effects DOE actions might have on wetlands.	A
3A.1 Vit 3B.1 Vit 2C	NEPA/ EPA	Endangered Species Protection 50 CFR§ 402 (OAC 1518, 1513.25) (OAC 1501-18-1-01)	Remedial actions must not jeopardize the continued existence of any endangered or threatened species, or potential habitat of threatened or endangered species.	R&A
2C	RCRA Sub. D	Solid, Nonhazardous Waste Disposal Facility Design Considerations OAC 3745-27-07	Establishes requirements for the design, construction, and operation of the proposed disposal facility for Subunit C material.	R&A
2C	RCRA Sub. D	Protection of Wetlands (Solid Waste Disposal Facility) 40 CFR§ 258.12	Establishes restrictions on the location of a solid waste disposal facility with respect to potential impacts on wetlands.	R&A

TABLE B.1-3

SUMMARY OF ARARS FOR OPERABLE UNIT 4 SELECTED REMEDIAL ACTION ALTERNATIVES

Action-Specific

Regulatory Alternative	Program	Regulatory Title and Citation	Regulatory Description	ARAR/TBC
3A.1 Vit 3B.1 Vit 2C	CAA	Prevention of Air Pollution Nuisance ORC 3704.01-.05 OAC 3745-15-07	Requires control of emissions of air pollutants during remediation that could endanger health, safety, or welfare of the public.	A

3A.1 Vit 3B.1 Vit	CAA	Control of Visible Particulate Emissions from Stationary Sources OAC 3745-17-07	Establishes requirements to prevent discharge of air emissions of a shade or density greater than 20 percent opacity during treatment operations.	A
3A.1 Vit 3B.1 Vit 2C	CAA	Control of Fugitive Dust OAC 3745-17-08	Visible emissions of fugitive dust generated during grading, loading, or construction activities must be minimized.	R&A
3A.1 Vit 3B.1 Vit	CAA	Restriction on Particulate Emissions from Industrial Processes OAC 3745-17-11	Treatment operations shall maintain emissions below specified particulate material release limits.	A
3A.1 Vit 3B.1 Vit 2C	CWA	Nationwide Permit Program 33 CFR§ 330	Establishes requirements for dredge and fill activities in jurisdictional wetlands.	A
3A.1 Vit 3B.1 Vit 2C	CWA	Discharge of Storm Water Runoff 40 CFR§ 122.26	Establishes requirements for monitoring and controlling runoff from construction sites greater than five acres.	A
3A.1 Vit 3B.1 Vit 2C	CWA	Discharge of Treatment System Effluent (Best Management Practices) 40 CFR§ 125.100 40 CFR§ 125.104	Program establishes measures to prevent releases from spills or runoff during the implementation of remedial actions.	R&A
3A.1 Vit 3B.1 Vit 2C	NEPA/ DOE	NEPA Implementation 10 CFR§ 1021	Requires NEPA evaluation and documentation for DOE activities.	A
2C	RCRA Sub. D	On-Site Solid Nonhazardous Waste Management Facilities (Design Standards) 40 CFR§ 241 Subpart B (OAC 3745-27-08)	Establishes design criteria for the proposed disposal facility for Subunit C material.	R&A
Regulatory Alternative	Program	Regulatory Title and Citation	Regualtory Description	ARAR/TBC
3A.1 Vit 3B.1 Vit	RCRA Sub. C	Hazardous Waste Determinations	Establishes procedures for identifying material as hazardous waste so that it	R&A (This

2C		40 CFR§ 262.11 (OAC 3745-52-11)	may be stored, treated, and disposed in accordance with RCRA requirements.	requirement will be applicable to non-excluded solid wastes)
3A.1 Vit 3B.1 Vit 2C	RCRA Sub. C	Management of Empty Containers 40 CFR§ 261.7 (OAC 3745-51-7)	Requirements to ensure containers are properly emptied and to ensure residuals removed from the containers are properly managed in accordance with RCRA requirements.	R&A
3A.1 Vit 3B.1 Vit	RCRA Sub. C	Generators Who Transport Hazardous Waste for Off-Site Treatment, Storage, or Disposal 40 CFR§ 262.20 - 262.33 and 263.20-31 (OAC 3745-52-20 through 33 and OAC 3745-53-20 through 31)	Establishes standards for generators shipping hazardous waste for off-site treatment, storage, or disposal.	A
3A.1 Vit 3B.1 Vit 2C	RCRA Sub. C	Treatment, Storage, or Disposal (TSD) Facility (General Stantards) 40 CFR§ 264, Subpart B (OAC 3745-54-13 through 16)	Establishes general standards for the proper management of material determined to be hazardous waste.	R&A
3A.1 Vit 3B.1 Vit 2C	RCRA Sub. C	TSD Facility (Preparedness and Prevention) 40 CFR§ 264, Subpart C (OAC 3745-54-31) 40 CFR§ 264.32 (OAC 3745-54-32) 40 CFR§ 264.33 (OAC 3745-54-33) 40 CFR§ 264.34 (OAC 3745-54-34) 40 CFR§ 264.35 (OAC 3745-54-35) 40 CFR§ 264.37	Establishes standerds for preparedness and prevention against fires, explosions, or unplanned releases of hazardous wasm at TSD facilities.	R&A

(OAC 3745-54 37)

Regulatory Alternative	Program	Regulatory Title and Citation	Regualtory Description	ARAR/TBC
3A.1 Vit 3B.1 Vit 2C	RCRA Sub. C	TSD Facility (Contingency Plan and Emergency Procedures) 40 CFR§ 264, Subpart D 40 CFR§ 264.51 (OAC 3745-54-51) 40 CFR§ 264.52 (OAC 3745-54-52) 40 CFR§ 264.55 and 56 (OAC 3745-54-55 through 56)	Establishes standards for contingency plans and emergency procedures in responding to fires, explosions, or unplanned releases of hazardous waste at TSD facilities.	R&A
2C	RCRA Sub. C	Releases from Solid Waste Management Units 40 CFR§ 264, Subpart F (OAC 3745-54-91 through 99 and OAC 3745-55-01 through 011)	Establishes groundwater monitoring requirements for assuring concentrations of hazardous constituents do not exceed regulatory levels.	R&A
3A.1 Vit 3B.1 Vit 2C	RCRA Sub. C	Closure 40 CFR§ 264, Subpart G 40 CFR§ 264.111,.114, and .116 (OAC 3745-55-11,-14, and -16)	Establishes closure requirements for TSD facilities.	R&A
2C	RCRA Sub. C	Post-Closure 40 CFR§ 264.117 (OAC 3745-55-17) 40 CFR§ 264.119 (OAC 3745-55-19)	Establishes requirements for the protection of human health and the environment following closure of the facility.	R&A
3A.1 Vit 3B.1 Vit 2C	RCRA Sub. C	Container Storage 40 CFR§ 264.171 - 178 Subpart I (OAC 3745-55-71 through -78)	Establishes standards for use and management of containers of hazardous waste.	R&A

3A.1 3B.1	RCRA Sub. C	Tank Systems 40 CFR§ 264, Subpart J (OAC 3745-55-91 through 96)	Establishes standards for the tank systems used in the vitrification treatment process.	R&A
3A.1 Vit 3B.1 Vit	RCRA Sub. C	Closure Requirements for Tanks 40 CFR§ 264.197 (OAC 3745-55-97)	Establishes closure and post-closure requirements for tank systems.	R&A
2C	RCRA Sub. C	Landfill Capping 40 CFR§ 264.310 (OAC 3745-57-10)	Establishes design standards for closure of the proposed disposal facility for Subunit C material.	R&A
Regulatory Alternative	Program	Regulatory Title and Citation	Regulatory Description	ARAR/TBC
3A.1 Vit 3B.1 Vit	RCRA Sub. C	Miscellaneous Units 40 CFR§ 264, Subpart X (OAC 3745-57-91 through 92)	Establishes standards for treatment, storage, and disposal of hazardous waste in miscellaneous units.	R&A
3A.1 Vit 3B. 1 Vit 2C	RCRA Sub. C	Corrective Action for SWMUs (CAMU and TU) 40 CFR§ 264, Subpart S 40 CFR§ 264.552 -.553	Establishes requirements and criteria for corrective action management units for management of remediation waste during remediation activities.	R&A
3A.1 Vit 3B.1 Vit 2C	RCRA Sub. C	Containment Buildings 40 CFR§ 264, Subpart DD	Establishes standards for containment buildings used for interim storage and management of material determined to be hazardous waste during remediation activities.	R&A
2C	RCRA Sub. C ORC 3734.02 (H)	Digging Where Hazardous or Solid Waste Was Located	Establishes post-remedial action institutional controls for on-site disposal of Subunit C material.	A
3A.1 Vit 3B.1 Vit 2C	SDWA OAC 3745-9-10	Ohio Water Well Standards	Establishes standards for abandonment of test borings, holes, and wells that might be used and/or closed as part of the remediation activities.	A
3A.1 Vit	AEA	Env. Rad. Protection Stds. for Mgt. and Disposal of	Establishes standards for management and storage for disposal of material	R&A

		HLRW, Spent Nuclear Fuel, and TRU Wastes 40 CFR§ 191, Subpart A 40 CFR§ 191.03(b)	from Subunit A to ensure the combined annual dose equivalent to any member of the public does not exceed specified limits. (This requirement pertains to only the on-site portion of this alternative).	
2C	UMTRCA	Standards for Control of Residual Radioactive Material 40 CFR§ 192, Subpart A 40 CFR§ 192.02(a)	Requires that controls for the residual radioactive material in the proposed on-site disposal facility be effective for 1000 years, where reasonably achievable, or at least 200 years.	R&A
2C	UMTRCA	Standards for Cleanup of Lands Contaminated with Residual Radioactive Materials 40 CFR§ 192, Subpart B 40 CFR§ 192.12(a)	Establishes standards for remedial actions to ensure residual concentration of radium-226 in soils does not exceed regulatory levels.	R&A
3A.1 Vit 3B.1 Vit 2C	UMTRCA	Implementation of Health and Environmental Protection Standards for Uranium Mill Tailings 40 CFR§ 192, Subpart C	Establishes guidance for remedial activities involving control and cleanup of residual radioactive material from OU4.	R&A

Regulatory Alternative	Program	Regulatory Title and Citation	Regulatory Description	ARAR/TBC
3A.1 Vit 3B.1 Vit 2C	DOE Order	Radiation Dose Limit (All Pathways) DOE Order 5400.5, Chapter II Section 1.a	Establishes limits for the allowable exposure of the public to radiation sources from all pathways as a result of routine DOE activities. Included as TBC to ensure adequate protection of human health and the environment from sources of radioactivity.	TBC

APPENDIX C

RESPONSIVENESS SUMMARY

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LIST OF ACRONYMS

AEA	Atomic Energy Act
BAT	Best Available Technology
CAB	Citizen's Advisory Board
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DOE	United States Department of Energy
DOE-FN	United States Department of Energy-Fernald Field Office
DOE-NV	United States Department of Energy-Nevada Field Office
DOT	United States Department of Transportation
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
FEIS	Final Environmental Impact Statement
FEMP	Fernald Environmental Management Project

FERMCO	Fernald Environmental Restoration Management Company
FFC Act	Federal Facility Compliance Act
FRESH	Fernald Residents for Environment, Safety, and Health
FS/PP-DEIS	Feasibility Study/Proposed Plan-Draft Environmental Impact Statement
HEAST	Health Effects Assessment Summary Table
MAWS	Minimum Additive Waste Stabilization
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act
NOI	Notice of Intent
NTS	Nevada Test Site
OAC	Ohio Administrative Code
OATP	Ohio Air Toxics Policy
OEPA	Ohio Environmental Protection Agency
OHPO	Ohio Historic Preservation Office
PEIC	Public Environmental Information Center
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RVFS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
STEP	Science, Technology, the Environment, and the Public
TCLP	Toxicity Characteristic Leaching Procedure

C.1.0 PURPOSE

As stated in United States Environmental Protection Agency (EPA) Guidance on Preparing Superfund Decision Documents (EPA 1989b), the responsiveness summary serves three important purposes. First, it provides United States Department of Energy (DOE) with information about community preferences regarding both the proposed remedial alternative and general concerns about the site. Second, it demonstrates how public comments were integrated into the decision-making process. Third, it allows DOE to formally respond to public comments.

The Feasibility Study/Proposed Plan/Draft Environmental Impact Statement was conditionally approved on February 9, 1994. In May 1994, five final concerns were received from the EPA on the document. In responding to these five concerns, several pages in the document were revised and are included in Attachment C.II.

This Responsiveness Summary has been prepared pursuant to the terms of the 1991 Amended Consent Agreement between DOE and the EPA, as well as other requirements, including:

- The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments Reauthorization Act, 42 United States Code, Sections 9601, et. seq.;

- National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 Code of Federal Regulations (CFR), Part 300;

- Community Relations in Superfund: A Handbook, January 1992c, EPA/540/R-92/009; and

- Guidance on Preparing Superfund Decision Documents: The Proposed Plan, The Record of Decision, Explanation of Significant Differences, The Record of Decision Amendment, Interim Final, July 1989b, EPA/540/G-89/007.

This Responsiveness Summary is used as the mechanism for DOE to identify and document the public involvement with the Operable Unit 4 Feasibility Study/Proposed Plan - Draft Environmental Impact Statement. After public comments and concerns had been formally submitted to DOE, in oral and written form, the comments were summarized into issue statements and responded to accordingly. The actual comments received are included in Attachment C.I of Appendix C.

Section C.2.0 of this Responsiveness Summary gives an overview of public involvement for the Fernald

Environmental Management Project (FEMP). Section C.3.0 gives an overview of the public's involvement in the development and approval of the Operable Unit 4 Feasibility Study/Proposed Plan- Draft Environmental Impact Statement. Section C.4.0 discusses the development of the issue statements and presents the public concerns and DOE responses. Section C.5.0 presents comments which did not result in issues.

C.2.0 PUBLIC INVOLVEMENT FOR THE FEMP

Environmental issues at Fernald first became public in 1984 when the site reported that nearly 300 pounds of uranium oxide had been inadvertently released to the atmosphere from the Plant 9 dust-collector system. It was also disclosed during this time that three privately-owned off-property groundwater wells south of Fernald had been found to be contaminated with uranium in 1981. In 1984, the citizens group called Fernald Residents for Environment, Safety and Health (FRESH) was formed and expressed concerns over these events and lack of public notification. In response to this public concern, the FEMP initiated a community relations program in 1985 aimed at informing the community of the mission of the facility and the ongoing and planned operations.

As part of this program, four community meetings were held in 1985 to open communication channels with the members of the public residing near the FEMP. As a result of these meetings and the need to prepare a community relations plan to support the planned Remedial Investigation/Feasibility Study (RI/FS), a community assessment was conducted in early 1986. The community assessment consisted of a series of interviews with local community members to define their informational needs, their concerns regarding the environmental issues at the site, and viable mechanisms to gain public involvement in the RI/FS decision-making process. As work on the RI/FS continued, DOE authorized the operating of an information repository called the Public Environmental Information Center (PEIC) in the JAMTEK building, 10845 Hamilton-Cleves Highway, Harrison, Ohio 45030. The administrative record, on which cleanup decisions are based, is also located at the JAMTEK building; another administrative record is maintained at EPA Region V headquarters in Chicago, Illinois.

A RI/FS Commnunity Relations Plan was issued in January 1986 detailing the initiatives that would be undertaken by the FEMP to promote community participation in the RI/FS decision-making process. This plan has been progressively revised, as necessary, to accommodate regulatory agency input, the changing concerns of the community, and emerging concepts on improved vehicles for facilitating community participation.

On May 15, 1990, a Notice of Intent (NOI) was published [55 Fed. Reg. 20183 (May 15, 1990)] indicating the intent of DOE to prepare an Environmental Impact Statement (EIS) consistent with the National Environmental Policy Act (NEPA) to evaluate the environmental impacts associated with the cleanup actions for the lead FEMP operable unit (i.e., Operable Unit 4). The NOI further defined the intent of DOE to prepare integrated CERCLA/NEPA documents for the remaining operable units that will tier from the lead document. The public, interested organizations, and federal, state, and local agencies were invited to provide oral comments at two EIS scoping meetings held on June 12-13, 1990, and to submit written comments until the close of the scoping period on June 29, 1990.

As a result of the scoping meetings, an EIS Implementation Plan was issued by DOE. The EIS Implementation Plan includes: a description of the proposed actions and remedial alternatives; a list of environmental issues to be considered in the EIS (including those identified during the scoping period); a list of proposed agency consultations; a responsiveness summary to comments received during scoping; and a discussion on the interrelationship between the NEPA compliance process and CERCLA project planning and decision-making. Consistent with the NOI and the EIS Implementation Plan, the resulting integrated process and documentation package developed for Operable Unit 4 is termed a Feasibility Study/Proposed Plan-Draft Environmental Impact Statement (FS/PP-DEIS).

In summary, several community relations activities are and have been conducted in support of local organizations at Fernald including:

- A community assessment (June -July 1989);
- A Community Relations Plan (August 1992 version approved October 15, 1992);
- Public reading rooms and administrative record;
- Regular briefings at local township trustee meetings;

- Presentations to the local community group, FRESH;
- Community meetings held approximately each quarter;
- Workshops and roundtable discussions for interested parties;
- Press releases, fact sheets and a newsletter;
- Public comment periods for decision documents and responsiveness summaries;
- Site tours, as requested;
- Open house events;
- Annual joint emergency response exercises;
- Annual environmental monitoring reports; and
- The Fernald Citizens Task Force.

C.3.0 COMMUNITY PARTICIPATION FOR OPERABLE UNIT 4

As indicated earlier, a community assessment was conducted in early 1986 which consisted of a series of interviews with local community members to define their informational needs, their concerns regarding the environmental issues at the site, and viable mechanisms to gain public involvement in the RI/FS decision process. Significant concerns associated with Operable Unit 4 facilities identified during these interviews included:

- The significantly elevated direct penetrating radiation field in the vicinity of the silos.

- The chronic emissions of significant quantities of the radioactive gas, radon, to the atmosphere from the silos.

- The structural instability of the silos' domes and the age of the remaining portions of the structures.

- The potential for leaching of the stored residues to the underlying sole-source aquifer.

To adequately identify and address community concerns, several initiatives have been undertaken by the FEMP to ensure community involvement in the decision-making process for the remediation of Operable Unit 4.

The draft Remedial Investigation (Rl) Report for Operable Unit 4 was released to the public for review and comment in April 1993. The document was made available to the public at the PEIC and the EPA offices in Chicago. The notice of availability for the Rl Report for Operable Unit 4 was published in local newspapers near the FEMP site on April 19, 1993. A public comment period was conducted for the Rl Report for Oposble Unit 4 from April 19, 1993 through May 19, 1993. No comments were received on the RI Report for Operable Unit 4.

On September 9, 1993, the draft Feasibility Study/Proposed Plan-Draft Enviromnental Impact Statement was made available at the Public Environmental Information Center, and stakeholders were encouraged to provide informal comments on the preliminary documents. Encouraging public inspection and informal comment on these preliminary documents, prior to EPA approval, provided a genuine opportunity for stakeholders to identify issues, voice their concerns and learn about proposed cleanup plans for Operable Unit 4. The informal opportunity for the public to provide input enabled DOE to address some stakeholder questions and concerns in advance of the formal public comment period.

On October 14, 1993, approximately 29 stakeholders attended a public roundtable on "Proposed Plans and Technology for Operable Unit 4 Remediation." At the roundtable, attendees were invited to offer opinions on the draft final Proposed Plan and the preferred alternative for Operable Unit 4 remediation. These stakeholder comments were documented and evaluated during preparation of the final document.

In addition, a two-way information exchange on the Operable Unit 4 Risk Assessment occurred at the October 19, 1993, Science, Technology, the Environment and the Public (STEP) session on "Risk." Again, Fernald personnel addressed the stakeholders' questions and concerns presented at the meeting. Information about the Operable Unit 4 Remedial Investigation Report was also provided at DOE's October 21, 1993, RI/FS public meeting and at local township trustee meetings.

ln response to stakeholder requests at the January 5, 1994, formal public hearing on the Operable Unit 3 (Production Area) Interim Record of Decision, a public roundtable to discuss integration of CERCLA and NEPA was held January 24, 1994. The roundtable included discussions on differences between environmental assessments and environmental impact statements; approximately 45 stakeholders attended.

On February 21, 1994, invitations to attend the March 21, 1994, formal public hearing on the Operable Unit 4 FS/PP-DEIS were mailed to approximately 2,000-plus Fernald stakeholders. The Proposed Plan for Remedial Actions at Operable Unit 4 Fact Sheet was enclosed with each invitation.

On February 24, 1994, advance copies of the Proposed Plan for Remedial Actions at Operable Unit 4 were mailed to several key stakeholders. Also on February 24, copies of the final FS/PP-DEIS and Proposed Plan fact sheets were mailed to the United States Department of Energy-Nevada Field Office (DOE-NV) and to the State of Nevada Clearinghouse. The DOE Operable Unit 4 Branch Chief personally distributed several advance copies of the Proposed Plan to attendees of the February 24, 1994, FRESH meeting. In addition, she provided an update on Operable Unit 4 activities, plans and progress, and was available for an informal question-and-answer session.

To encourage stakeholders to review and offer input on the final FS/PP-DEIS, a Notice of Availability for formal public comment was published in March 1994 in the Federal Register and three local newspapers: The Cincinnati Enquirer, the Journal-News and the Harrison Press. On March 1, 1994, the, FS/PP-DEIS became available at the PEIC.

On March 2, 1994, Ohio EPA representatives discussed the FS/PP-DEIS with members of the Fernald Citizens Task Force and FRESH.

On March 4, 1994, a Fernald site news release titled "Key Fernald Cleanup Plan Receives Conditional EPA Approval" was sent to local electronic and print media, as well as local elected officials, FRESH and the Fernald Citizens Task Force. Articles were published in local newspapers.

On March 7, 1994, the formal 45-day public comment period on the Operable Unit 4 FS/PP-DEIS officially began.

On March 8, 1994, Fernald representatives met formally with officials of the DOE-NV and the Nevada Division of Environmental Protection and provided a presentation on the Operable Unit 4 FS/PP-DEIS.

On March 15, 1994, postcard reminders about the March 21, 1994, formal public hearing were mailed to Fernald stakeholders. In addition, courtesy phone calls were made to key stakeholders, inviting them to the formal public hearing.

Display advertisements announcing the March 21, 1994, formal public hearing were published in three local newspapers: The Cininnati Enquirer, March 18, 1994 and March 20, 1994; the Cincinnati Post, March 18, 1994; and the Journal-News, March 18, 1994.

On March 21, 1994, approximately 80 people attended the formal public hearing on the Operable Unit 4 FS/PP-DEIS. Formal oral public comments were documented by a court reporter and are available in a written transcript at the PEIC and in Attachment C.IV of Appendix C. In addition, several stakeholders submitted formal written comments. All formal written and oral stakeholder comments and questions asked informally during the March 21, 1994, public hearing, as well as DOE's responses, are documented in the Operable Unit 4 Responsiveness Summary.

During April 1994, the DOE received a request from the State of Nevada to extend the public comment period for sixty (60) days to allow a newly formed Citizen's Advisory Board (CAB) additional time to review and comment on the Operable Unit 4 FS/PP-DEIS. In accordance with the requirements of the NCP and the Amended Consent Agreement, the DOE granted a 30-day extension of the public comment period from April 20, 1994 to May 20, 1994 to accommodate this request.

On May 11, 1994, the DOE-NV conducted a public meeting in Las Vegas, Nevada. In attendance were members from the DOE, EPA (Region V), Ohio EPA, CAB and the public. This meeting was the first meting of the newly-organized CAB. As part of the meeting's agenda, the DOE conducted two presentations. One of the presentations, furnished by the DOE-FN, discussed the Operable Unit 4 FS/PP-DEIS and summarized the proposal to transport and dispose of low-level radioactive wate, which would be generated by the cleanup and environmental restoration of the FEMP site as a whole (including Operable Unit 4), at the NTS. The other presentation was furnished by the DOE-NV which summarized the current low-level radioactive waste management program at the NTS.

Each presentation was followed by a formal question and answer session, during which the following concerns were discussed:

- Adequacy of characterization process of all FEMP waste shipped to the NTS.
- Classification of the K-65 by-product material as 11(e)(2) material.
- Availability of any alternative disposal sites for the Operable Unit 4 remedial wastes.
- 40 CFR §191 "relevance" to Operable Unit 4 remedial wastes by EPA.
- Transportation and containerization of the Operable Unit 4 remedial wastes.
- Benefits to be derived by the State of Nevada for disposing of the waste at the NTS.

The complete transcript of this meeting is included in Attachment C.IV of Appendix C.

During the meeting, the CAB noted that they had not received a copy of the Operable Unit 4 FS/PP-DEIS for renew and comment. It was noted that a copy of the Operable Unit 4 FS/PP-DEIS was available in the DOE-NV Reading Room. Copies of the Proposed Plan and Proposed Plan Fact Sheet were distributed to members at the meeting. A copy of the Operable Unit 4 FS/PP-DEIS was provided to the CAB on May 12, 1994.

In addition, the CAB verbally requested in the meeting that the comment review period for the Operable Unit 4 FS/PP-DEIS be extended an additional thirty days to provide the CAB adequate time to review the document. Subsequently, on May 19, 1994, DOE submitted to EPA a second request for extension in the submittal of the Operable Unit 4 ROD. The EPA reviewed this request pursuant to Section XVIII of the 1991 ACA, which requires EPA to determine whether good cause exists for a schedule extension based upon, among other things, information submitted by DOE. In response to the CAB request, the DOE on May 20, 1994 formally granted the thirty-day extension of the public comment period from May 20, 1994 to June 19, 1994. On May 26, 1994, the EPA granted the 30-day extension for submittal of the Proposed Draft ROD from July 10, 1994, to August 9, 1994.

On August 8, 1994, DOE submitted the Proposed Draft Record of Decision for Remedial Actions at Operable Unit 4 and the Responsiveness Summary to the EPA.

C.4.0 SUMMARY OF ISSUES AND RESPONSES

The FS/PP-DEIS for Operable Unit 4 was released for public comment in March 1994. The DOE reviewed all written and oral comments submitted during the public comment period. Upon review of these comments, it was determined that no significant changes to the remedy, as was originally identified in the Operable Unit 4 FS/PP-DEIS, were necessary.

This Responsiveness Summary document has focused on the formal comments submitted during the public comment period and oral comments received during the March 21, 1994 community meeting held in Harrison, Ohio and the May 11, 1994 public meeting held in Las Vegas, Nevada. Within this Responsiveness Summary, oral and written comments (see Attachment C.I) were categorized into significant issues. For each of these issues, an issue statement has been prepared that addresses the concerns expressed by one or more of the commentors. In many instances, the issue statements are paraphrased from the original comments to succinctly represent the combined concerns of several commentors. The issues resulting from formal comments have been compared with the questions raised during the public question and answer sessions to ensure that all significant issues have been represented by the issue statements.

For the purpose of developing issue statements, a comment is considered significant if it involves:

- The definition of the preferred alternative,
- Public or state acceptance of the preferred alternative,
- The implementation or impacts of the preferred alternative,
- Conclusions drawn from evaluations or assessments provided within the document,
- Safety of the work performed, or the
- Enforceability of the decision reached.

At the end of each issue statement, the specific comment letter(s) or oral comment(s) in which the issue was raised is identified in parentheses. The comments are referred to by an alphabetic identifier. These comments are also part of the administrative record for this action. Table C.4-1 provides a cross-reference of the alphabetic identifiers with the commentors.

TABLE C.4-1
FORMAL ORAL AND WRITTEN COMMENTS RECEIVED

ITEM	COMMENTOR	PAGE NUMBER
FORMAL ORAL COMMENTS		
A	Norma Nungester, resident and FRESH member	C-I-8
B	Vicky Dastillung, resident and FRESH Vice President	C-I-19
C	Lou Bogar, resident, Hamilton, Ohio	C-I-20
D	Edwa Yocum, resident and FRESH Secretary	C-I-28
FORMAL WRITTEN COMMENTS		
E	Maud Naroll, State of Nevada, State Clearinghouse (April 18, 1994)	C-I-31
F	Jack and Roberta Warndorf, resident, Okeana, Ohio	C-I-34
G	Edwa Yocum, resident and FRESH Secretary, Harrison, Ohio	C-I-36
H	J. E. Walther, resident, Hamilton, Ohio	C-I-36
I	Martha J. Raymond, Department Head, Technical Review Services, Ohio Historic Preservation Office	C-I-38
J	Lisa Crawford, resident and FRESH President	C-I-40
K	Lawrence L. Stebbins, resident, Hamilton, Ohio	C-I-41
L	Maud Naroll, State of Nevada, State Clearinghouse (April 5, 1994)	C-I-43
M	James K. O'Steen, Director, Office of Hazardous Materials Technology, U.S. Department of Transportation	C-I-45
N	William L. Vasconi, Acting Chairman, Nevada Test Site Citizens Advisory Board	C-I-47
O	Nevada Test Site Citizens Advisory Board	C-I-48
P-1	Nichole Davis, 1600 E. University #151, Las Vegas, NV 89119	C-I-49
P-2	Shellie Michael, 2800 S. Eastern #717, Las Vegas, NV 89109	C-I-49
P-3	Lynn Rohl, P.O. Box 12303, Las Vegas, NV 89112	C-I-50
P-4	Ted Mucha, 301 Orland #8, Las Vegas, NV 89107	C-I-50
P-5	Mark Michael, 2800 S. Eastern #717, Las Vegas, NV 89109	C-I-51
P-6	Kathleen Guise, 4124 Seville St., Las Vegas, NV 89121	C-I-51
P-7	Jo Anne Moran, 3128 E. Flamingo #203, Las Vegas, NV 89121	C-I-52

P-8	Catherine A. McLaughlin, 1721 Howard Ave., Las Vegas, NV 89104	C-I-52
P-9	Nancy Gott, 3212 Brahns Dr., Las Vegas, NV 89102	C-I-53
P-10	Rebecca Webber, 5070 River Glen Dr. #457, Las Vegas, NV 89103	C-I-53
P-11	Tanya Carr, 2032 Shadow Brook Way, Las Vegas, NV 89014	C-I-54
P-12	Jim Macklin, 5178 Silverheart Ave., Las Vegas, NV (no zipcode provided)	C-I-54

ITEM	COMMENTOR	PAGE NUMBER
P-13	Cindy Weatherby, 1760 N. Decatur #69, Las Vegas, NV 89108	C-I-55
P-14	Rebecca Heider, 6941 W. Forest Vista St., Las Vegas, NV 89117 T	C-I-55
P-15	Troy Weatherby, 1760 N. Decatur #69, Las Vegas, NV 89108	C-I-56
P-16	Abraham Hartman, 1872 Pasadena Blvd., Las Vegas, NV 89115	C-I-56
P-17	Vicki Cassman, P.O. Box 72634, Las Vegas, NV 89170	C-I-57
P-18	Art Goldberg, 14810 Living Desert Dr., Las Vegas, NV 89119	C-I-57
P-19	Jillian Beth Wright, 6435 Iorn Bark Lane (address provided incomplete)	C-I-58
P-20	Linda Strange, 4830 Nara Vista Way #102, Las Vegas, NV 89103	C-I-58
P-21	Ronnie Strange, 4830 Nara Vista Way #102, Las Vegas, NV 89103	C-I-59
P-22	Mindy Brummett, 6397 Spring Meadow Dr., Las Vegas, NV 89103	C-I-59
P-23	LaLori Rossi, 1929 Frasklis Ave. (address provided incomplete)	C-I-60
P-24	Taryn Cunningham, 7383 Newcrest Cir., Las Vegas, NV 89117	C-I-60
P-25	Tiffany Brummett, 6397 Spring Meadow Dr., Las Vegas, NV 89103	C-I-61
P-26	Janet Zimmerman, 1912 Spangle Dr., Las Vegas, NV 89108	C-I-61
P-27	Janene Zimmerman, 1912 Spangle Dr., Las Vegas, NV 89108	C-I-62
P-28	Patricia Bishop, 1400 S. Casino Ct. #19, Las Vegas, NV 89104	C-I-62
P-29	Daniel J. Fedor, 185 Swaab, Las Vegas, NV 89115	C-I-63
P-30	Michael Carrigan, 7217 Tempest Pl., Las Vegas, NV 89128	C-I-63
P-31	Renee Halm, 1000 King Richard, Las Vegas, NV 89119	C-I-64
P-32	Tubiola Lopez, 1508 Living Desert Dr., Las Vegas, NV 89119	C-I-64
P-33	Doreina Saenz, 2111 Fairfield #6, Las Vegas, NV 89102	C-I-65
P-34	Jerome Brenberg, 5668 Divot Pl., Las Vegas, NV 89130	C-I-65

P-62	Huy Phan, 3719 Central Park Circle, #4 (address provided incomplete)	C-I-79
P-63	Sandra Travez, 30 Tierra Buena Drive, Las Vegas, NV 89110	C-I-80
P-64	Steve Zahn, 8305 Greshen, Las Vegas, NV (no zipcode provided)	C-I-80
P-65	Lisa Nunaq, 1009 Spire CNYN, Las Vegas, NV 89128	C-I-81
P-66	Tim Jaqua, 3273 E. Flamingo #102, Las Vegas, NV 89121	C-I-81
P-67	Shelli McKenney, 4640 Victoria Beach Way, Las Vegas, NV (no zipcode provided)	C-I-82
P-68	Carmen Davis, 6666 W. Washington #463, Las Vegas, NV 89107	C-I-82
P-69	Nasreen Bakhtary, 2165 E. Rochelle #71, Las Vegas, NV 89119	C-I-83
P-70	Maribel McAdory, 2529 Pacific Avenue, Las Vegas, NV (no zipcode provided)	C-I-83
P-71	Merlinda Gollegos, 5625 W. Flamingo #2005, Las Vegas, NV 89103	C-I-84
P-72	Chad Hunt, 8222 Beaverbrook Way, Las Vegas, NV 89123	C-I-84
P-73	Barb Brentz, 1015 Franklin Avenue, Las Vegas, NV 89104	C-I-85
P-74	Mayte Villanueva, 1805 Evelyn Avenue, Henderson, NV 89015	C-I-85
P-75	James Min, 5315 Heatherbrook Circle, Las Vegas, NV 89120	C-I-86
P-76	David Johnson, 3632 Hamlin, Las Vegas, NV 89030	C-I-86

ITEM	COMMENTOR	PAGE NUMBER
P-77	Laura Yada, 4770 Gym Road, Las Vegas, NV 89119	C-I-87
P-78	Shannon Conners, 1213 Sloop Drive, Las Vegas, NV 89128	CC-I-87
P-79	Sherri Caron, 3913 Courtside, Las Vegas, NV 89105	C-I-88
P-80	Stevi Carroll, 6505 Burgundy Way, Las Vegas, NV 89107	C-I-88
P-81	Margaret Bean, 3060 Ramrod, Las Vegas, NV 89108	C-I-89
P-82	Patrice L. Harvey, 7412 Summer Crest Lane, Las Vegas, NV 89129	C-I-89
P-83	Robin Wayne, 3400 Turquoise Road, Las Vegas, NV 89108	C-I-90
P-84	George A. Bean, 3060 Ramrod Street, Las Vegas, NV 89108	C-I-90
P-85	Robert Pierson, 2974 Liberty Avenue, Las Vegas, NV 89121	C-I-91
P-86	Tim Bartlett, 4504 Fireside Lane, Las Vegas, NV 89110	C-I-91
P-87	Selma and Chuck Umnuss, 8504 Glenmount Drive, Las Vegas, NV 89134-	C-I-92

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P-115	Joel Delmendo, 3138 Gaucho Drive, Las Vegas, NV 89008 (zip code hard to read)	C-I-106
P-116	Katherine Garder, 5050 Tamanas #267, Las Vegas, NV 89119	C-I-106
P-117	Jason Benatz 6317 Hobart, Las Vegas, NV 89107	C-I-107
P-118	Ebony Samerkand, 549 Kristin Lane, Henderson, NV 89015	C-I-107
P-119	Stacy Smith 4223 Grove Circle #4, Las Vegas, NV 89119	C-I-108
P-120	Sanena Shelling, 1445 E. Rochelle (address, provided incomplete)	C-I-108
P-121	Gerald F. Cuetkovic, 135 Grandview Drive, Henderson, NV 89015	C-I-109
P-122	Judy Cuetkovic, 135 Grandview Drive, Henderson, NV 89015	C-I-109
P-123	Michael Cuetkovic, 135 Grandview Drive, Henderson, NV 89015	C-I-110
P-124	Mrs. G. Michakel, 4079 El Segundo Avenue, Las Vegas, NV 89121-1703	C-I-110
P-125	Willene De Langis, 758 Willow Avenue, Henderson, NV 89015	C-I-111
P-126	Donald A. De Langis, 758 Willow Avenue, Henderson, NV 89015	C-I-111
P-127	Robert Tonelli, 1004 University Ridge, Reno, NV (no zipcode provided)	C-I-112
P-128	Ruth Lindahl, 9457 S. Las Vegas Blvd. S. #93, Las Vegas, NV 89123	C-I-112
P-129	Melody Derrick, 330 S. 10th St., Las Vegas, NV 89107	C-I-113
P-130	Doug Jablin, 3559 Markan St., Las Vegas, NV 89121	C-I-113
P-131	Anthony Bondi, 135 Albert Avenue St. E. #16, Las Vegas, NV (no zipcode provided)	C-I-114
P-132	T. Jones, Box 73215, Las Vegas, NV 89170	C-I-114
P-133	John A. Loeffler, P.O.Box 832, Searchlight, NV 89046	C-I-115
P-134	Christopher Mercer, 2517 Huber Hts., Las Vegas, NV 89128	C-I-115
P-135	Kurt Buchida, 325 Maryland Parkway, Las Vegas, NV 89101	C-I-116
P-136	Liz Marion, 6824 Adobe Court, Las Vegas, NV 89102	C-I-116
P-137	Dennis A. Dewitt, Box 5371, Reno, NV 89513	C-I-117

ITEM	COMMENTOR	PAGE NUMBER
P-138	Brenda Weksler, 7904 Marbella Circle, Las Vegas, NV 89128	C-I-117
P-139	Cheryl Frossa, 3450 Erva St. #101, Las Vegas, NV 89117	C-I-118

P-140	Harriet R. Gagliano, 2713 Gilmary Avenue, Las Vegas, NV 89102	C-I-118
P-141	Kathy Poma, 2113 Fountain Springs Drive, Henderson, NV 89014	C-I-119
P-142	Stacey Hallenberg, 2245 Maple Rose Drive, Las Vegas, NV 89134	C-I-119
P-143	Kelli Koerwitz, 909 Willowtree, Las Vegas, NV 89128	C-I-120
P-144	Trish Taylor, 2113 Fountain Springs Drive, Henderson, NV 89014	C-I-120
P-145	Heather Davis, 2031 E. Windmill Lane, Las Vegas, NV 89123	C-I-121
P-146	Marilyn Benoit, 3461 Pointe Willow, Las Vegas, NV 89120	C-I-121
P-147	Richard Lewnau, 2950 S. Decatur D-3, Las Vegas, NV 89102	C-I-122
P-148	Susan Thornton, 1412 Golden Spur Lane, Las Vegas, NV 89117	C-I-122
P-149	Lee Dazey, 72 Keystone Avenue, Reno, NV 89503	C-I-123
P-150	Pete Mastin, P.O. Box 92, Verdi, NV 89439	C-I-123
P-151	Tracie K. Lindeman, P.O. Box 1672, Fallon, NV 89407	C-I-124
P-152	David L. Platerio/Tosa-wi-e, P.O. Box 822, Elko, NV 89803	C-I-124
P-153	Jo Ana Garrett, P.O. Box 130, Baker, NV 89311	C-I-125
P-154	Margaret Norman, 2332 Grant Street, Berkeley, CA 94703	C-I-125
P-155	Judy Treichel, 3926 Bushnell Drive #71, Las Vegas, NV 89103	C-I-126
P-156	Lorry C. Johns, 2090 Westwind Road, Las Vegas, NV 89102	C-I-126
P-157	Steve Frishman, 208 N. Hwy. 95A, Yerington, NV 89447	C-I-127
P-158	William Rosse Sr., HC61 Box 6240, Austin, NV 89310-9301	C-I-127
P-159	Corbin Hanuf (?), P.O. Box 1255, Nevada City, CA 95959 (name was hard to read)	C-I-128
P-160	Shawn Black, 650 Whitney Ranch #1423, Las Vegas, NV (no zipcode provided)	C-I-128
P-161	Lawrence Skinner, 1604 E. Evans, Las Vegas, NV 89030	C-I-129
P-162	Mary L. Johns, 2090 Westwind Road, Las Vegas, NV 89102	C-I-129
P-163	Bob Fulkerson, 725 McDonald Drive, Reno, NV 89503	C-I-130
P-164	Carla Baker Wallace, 3245 Mallard, Las Vegas, NV 89107	C-I-130
P-165	Louise (?), 4255 Tamarus #217, Las Vegas, NV 89119 (name was hard to read)	C-I-131

Issue 1 - Public Participation Process

(a) A formal request was made by Maud Naroll, State of Nevada, Department of Administration, State Clearinghouse, on the behalf of the Nevada Test Site (NTS) Citizens Advisory Board (CAB) to extend the public review period for the Operable Unit 4 FS/PP-DEIS for at least 60 days. The CAB was recently formed and held its first organizational meeting on March 8, 1994. Because of the key role the CAB will play in advising the DOE-NV about stakeholder concerns, the requested extension to the public comment period would allow the CAB adequate time to address the Operable Unit 4 document. (Commentor: L)

(b) On May 17, 1994, a formal request was made by William L. Vasconi, Acting Chairman, NTS CAB to extend the public review period for the Operable Unit 4 FS/PP-DEIS. The NTS CAB had the opportunity to meet with representatives of the Fernald Environmental Management Project on May 11, 1994. The CAB stated that this meeting was the first time it had an opportunity to receive any information about the Operable Unit 4 FS/PP-DEIS. Because the CAB had not yet reviewed the Operable Unit 4 documents and the May 20, 1994 deadline for public comments was near, the extension of time was necessary in order that the CAB may provide substantive input into the process. (Commentor: N)

Response: (a) The United States Department of Energy (DOE) considered the request for extension of the public review period to be in accordance with the provision of the National Oil and Hazardous Pollution Contingency Plan, 40 CFR 300.430(f)(3)i)(C) as follows:

"Upon timely request, the lead agency [DOE] will extend the public comment period by a minimum of 30 additional days;.."

The DOE recommended that a 30-day extension, as opposed to the 60-day extension, be granted in an effort to minimize schedule impacts, as well as providing adequate time for the CAB to review the Operable Unit 4 document. In accordance with Sections XVIII.B.5 and XVIII.D of the Amended Consent Agreement (1991), the DOE requested concurrence from the EPA for the 30-day schedule extension to the public review period. The EPA vabally concurred with the DOE 30-day request for schedule extension on April 18, 1994, and followed up with a written concurrence on April 29, 1994. The DOE issued formal notification of the 30-day extension to the State of Nevada on May 3, 1994. This documentation can be found in the Administrative Record.

(b) The DOE considered the CAB request for extension of the public review period to be in accordance with the provision of the National Oil and Hazardous Pollution Contingency Plan, 40 CFR 300.430(f)(3)(i)(C) as follows:

"Upon timely request, the lead agency [DOE] will extend the public comment period by a minumum of 30 additional days;.. "

On May 20, 1994, the DOE granted an additional 30-day extension to the public review period for the Operable Unit 4 FS/PP-DEIS. In accordance with Sections XVIII.B.5 and XVIII.D of the Amended Consent Agreement (1991), the DOE requested concurrence from the EPA for the 3o-day schedule extension to the public review period. The EPA provided written concurrence on the DOE 30-day extension request on May 26, 1994. This documentation can be found in the Administrative Record.

Issue 2 - Characterization of Silo Residues During the March 21, 1994 Operable Unit 4 public meeting, questions were raised by Mr. Lou Bogar, a resident of the City of Hamilton Ohio, about perceived discrepancies in the isotopic uranium data reported for some of the silo residues. He also expressed concerns about the inorganic chemical data for the silo residues. His specific concerns were as follows:

(a) Why does the analytical data on the silos presented report Uranium 235/236? Do the silos contain uranium-236 (U-236)?

(b) There seems to be a discrepancy in the ratio of U-234 to U-238. The ratio of these isotopes should be close to unity. The U-234/U-238 ratio for Silo 2 appears to be correct however, the ratio for Silo 1 does not appear to be right.

(c) Is there a full list of inorganic constituents for Operable Unit 4? Why isn't gold listed as one of the analytes? Are there other elements, for which analysis was not done, that may impact the vitrification process? In particular, what about rare earths (the lanthanide series of elements)? Could these affect vitrification?

(Commentor: C)

In addition, on June 24, 1994, DOE received significant comments from a member of the Nevada Test Site Citizens Advisory Board (CAB). The CAB expressed the following four concerns over the physical characteristics of the untreated silo residues and the treated waste form:

Based on the presence of RCRA regulated metals and organics in the waste, we are concerned that the waste contains both hazardous and radioactive constituents.

(d) Please list the radionuclide and inorganic and organic chemical constituents of the waste.

(e) Please identify the concentration of each constituent.

(f) Please identify the risk resulting from each constituent.

(g) Please describe how the proposed treatment and disposal mechanism address both the radionuclide and chemical constituents of the waste.

(Commentor: O)

Response: (a) The Silos do not contain U-236. U-236 is a by-product of nuclear reactor processing. The residues in the silos were generated exclusively from the chemical processing of pitchblende ores and uranium concentrates to extract uranium. Consequently, the residues in silos would not contain U-236.

The U-235 analysis was done using the standard radiochemistry technique of alpha spectroscopy. Because the energies emitted by U-235 and U-236 are very close in intensity, it is difficult for the laboratory to individually resolve between U-235 and U-236 activity concentrations. As a result it is accepted laboratory convention to report radiochemical results for these isotopes as U-235/236. The analytical data for U-235 concentrations in the silos were reported from the laboratory using this convention. This was not intended to imply that the silos contain U-236.

(b) In his comments made during the March 12, 1994 Operable Unit 4 Public Hearing, Mr. Bogar pointed out that there appeared to be some anomalies in the isotopic uranium data presented during that meeting. The data provided during the public meeting represented average activity concentrations calculated from individual sample results contained in Volume 2 of the Operable Unit 4 Remedial Investigation Report (available for review in the PEIC). Through process knowledge it is known that the K-65 Silos contain natural uranium which resulted from the processing of pitchblende ores and uranium concentrates. As such, the activity concentration ratio of U-238 to U-234 in any sample obtained from the silos should be approximately 1. In the data presented for Silo 1, however, the ratio of U-238 to U-234 is 0.8, implying that the uranium contained in Silo 1 may be enriched.

This apparent anomaly is caused by a combination of two factors: the use of average activity concentrations to represent activity concentration ratios and apparent errors in the U-234 activity concentrations reported by the laboratory for four of the Silo 1 samples. While average activity concentrations are adequate for gross estimates of the silo contents, using activity concentration ratios calculated from these average activity concentrations is inappropriate, due to the heterogeneous nature of the silo contents (it should also be noted that averaging of the data can propagate the inherent uncertainty in the analytical data for individual samples). Instead, the activity concentration ratios of U-238 to U-234 should be addressed on a sample-by-sample basis.

Review of the individual sample data (contained in Volume 2 of the Operable Unit 4 RI Report) will indicate that the ratios of U-234 and U-238 are close to unity as expected for natural uranium (within the limits of the total propagated uncertainty) for 16 of the 20 samples taken. The remaining four samples demonstrated higher U-234 values, which yielded U-238 to U-234 ratios in the range of 0.4 to 0.6. This knowledge should have been sufficient to reject the analytical results for these four samples. The sample results, however, had already been validated using standard EPA protocols and the determination had been made to publish and use all validated analytical results. While this decision could have been overturned, it was further determined that these apparently anomalous U-234 analytical results for these four samples had no impact on the risk assessment for Operable Unit 4 and, as a result, would have no impact on the evaluation of remedial action alternatives within the Operable Unit 4 Feasibility Study.

(c) Volume 2 of the Operable Unit 4 Remedial Investigation Report presents a full listing of all analytical data collected during the remedial investigation. The data presented in the public meeting on March 21, 1994 were taken from the Operable Unit 4 Remedial Investigation Report. These data primarily provide critical information used in the risk assessment process to determine the nature and magnitude of potential chemical hazards and/or cancer risk posed by the contents of the silos. Treatability studies were conducted using actual silo residues to determine the effectiveness of the vitrification process in stabilizing these materials (the Operable Unit 4 Treatability Study Report for the Vitrification of Residues from Silos 1, 2, and 3 is available for review in the PEIC). Analysis was performed on the silo residues during the treatability studies to provide information pertinent to determining the effectiveness of vitrification.

The DOE does have historical data on the gold content of the K-65 residues. The vitrification process can be affected if there are large amounts of noble metals such as gold present. However, the gold present in the silo residues does not pose a problem as evidenced by the results of the vitrification treatability studies.

"Rare earths" or elements in the lanthanide series are known to improve the durability of glass [reference, Volf, M.B. 1984, Chemical Approach to Glass (glass Science and Technology: Vol 7), Elsevier, New York]. Analysis was conducted for some "rare earth" elements such as cerium and lanthanum during the treatability studies.

(d, e) The material contained in Silos 1 and 2 (K-65 material), and Silo 3 is by-product material or residue resulting from the processing of uranium ore and is specifically exempt from regulation as solid waste under RCRA 40 CFR §261.4(a)(4). The State of Nevada has expressed similar concerns over the regulatory classification of the Operable Unit 4 remedial wastes. A detailed discussion of these regulatory issues is presented under Issue 4 - State of Nevada Regulatory Concerns.

A complete list of radionuclide, inorganic and organic chemical constituents of the Silos 1, 2 and 3 wastes and their respective concentrations can be found in Tables A.1-1, A.1-5, A.1-6, A.1-7, A.2-1 and A.2-6 in Appendix A of the FS Report for Operable Unit 4 (FS/PP-DEIS).

(f) Appendix D, Section D.2.0 of the FS Report for Operable Unit 4 (FS/PP-DEEIS) presents a summary of risk characterization results from the Operable Unit 4 Baseline Risk Assessment, as reported in the Remedial Investigation Report for Operable Unit 4. The Baseline Risk Assessment was performed, in accordance with available EPA guidance for conducting CERCLA risk assessments and methodology described in the EPA-approved Risk Assessment Work Plan Addendum for performing risk assessments at the FEMP. The complete list of radionuclide, inorganic and organic chemical constituents of the Silos 1, 2 and 3 wastes were evaluated along with information describing their toxicity, mobility and environmental persistence. The baseline risk characterization indicates that baseline conditions do not meet acceptable public health risk criteria.

Appendix D, Section D.3.0 of the FS Report for Operable Unit 4 (FS/PP-DEIS) evaluates the short-term and long-term risks associated with implementing the various remedial alternatives considered for Operable Unit 4. The detailed analysis of the Operable Unit 4 remedial action alternatives is presented in Section 4.0 of the FS Report for Operable Unit 4 (FS/PP-DEIS), where each alternative is evaluated relative to the nine criteria of the NCP. Two of these criteria are short-term effectiveness and long-term effectiveness.

The short-term effectiveness criterion addresses the effect of an alternative during the construction and implementation phase until the remedial action objectives are achieved. The evaluation considers the effects on human health and the environment posed by operations conducted during the remedial action. The long-term effectiveness criterion evaluates the extent to which an alternative achieves an overall reduction in risk to human health and the environment after the remedial action objectives have been met.

The risk assessment presented in Appendix D supports the application of these criteria through the Section 4.0 evaluation of human health risks resulting from potential short-term and long-term exposures associated with the Operable Unit 4 remedial action alternatives. This includes the preferred remedy for disposing of the treated Operable Unit 4 residues at the NTS.

(g) Appendix C, Section C.3.0 of the FS Report for Operable Unit 4 (FS/PP-DEIS) presents a summary of all the vitrification treatability study tests which were carried out in support of the Operable Unit 4 RI/FS process at the FEMP. The tests were completed as specified by the EPA-approved Operable Unit 4 Treatability Study Work Plan for the Vitrification of Residues from Silos 1, 2, and 3 (DOE 1992b). The purpose of these tests was to allow the performance of vitrification of the Silos 1, 2, and 3 residues to be compared to other remediation technologies for the silo residues. The criteria upon which this comparison was to be based were the leachability of the waste form, the waste volume reduction achieved, and the reduction in radon emanation from the waste.

The Toxicity Characteristic Leaching Procedure (TCLP) results for the vitrified wastes demonstrated the effectiveness of glass as a durable leach resistant waste form for Operable Unit 4 remedies. Leachate concentrations of hazardous metals were below regulatory limits for all of the glasses made in these tests, including the leachate concentration of lead which was reduced about 500 times less than from the untreated waste. Radionuclides (in particular, Ra-226) were found to leach from the glasses at the same rate as the major glass constituents, indicating the absence of selective leaching of radionuclides.

Appendix C, Table C.3-13 of the FS Report for Operable Unit 4 (FS/PP-DEIS) reports the specific gravity of the vitrified waste along with the calculated volume reduction. The volume reduction is based upon the difference between the volume of the final glass product (including additives) and the initial volume of the waste in its current state. The waste volume was calculated using the wet, compacted density, which is assumed to be the most representative of the material in its current state. Significant volume reductions ranging from 50 percent to 68 percent are achieved through vitrification of the waste. In summary, the final waste volume ranged from 32 percent of the initial waste volume in the best case to only 50 percent of the initial waste volume in the worst case.

The radon emanation rate from the vitrified K-65 material ranged from 0.01 to 0.06 $pCi/m^2/s$, more than two orders of magnitude less than the EPA limit of 20 pCi/m2/s for radon emanation from uranium mill tailings. The measured radon emanation rate from the glass is approximately equal to the emanation rate from natural building materials such as brick and concrete, even though the radium content of the waste glass is 103 to 106 times greater than that of natural building materials.

The NTS has established waste acceptance criteria which consider disposal site characteristics consistent with an appropriate level of protectiveness to human health and the environment. The Operable Unit 4 remedial waste will comply with these waste acceptance criteria and the NTS will also perform evaluation to assure that the acceptance criteria are met.

Issue 3 - Public Participation During Post-RI/FS Activities

The current FEMP Community Relations Plan does not adequately define the public's role, nor its nature and extent of opportunities for participation during post-RI/FS activities. During the Operable Unit 4 formal public comment period, members of the public and the Ohio EPA requested formal definition of their level of participation during the Remedial Design and Remedial Action processes. Members of the community expressed a desire to continue their same level of involvement in post-RI/FS activities, as defined by the current Community Relations Plan for the RI/FS program. (Commentors: A, B, D, G, J and R)

Response: The DOE is both actively and expeditiously pursuing the revision of the current FEMP Community Relations Plan to include post-RI/FS public involvement activities throughout the Remedial Design and Remedial Action processes. Until a comprehensive Community Relations Plan is finalized by the DOE, an Interim (post-RI/FS) Community Relations Plan has been prepared as guidance to Fernald personnel on public involvement activities. A revised Community Relations Plan addressing post-RI/FS public involvement activities will be issued by September 1994.

Issue 4 - State of Nevada Regulatory Concerns

The State of Nevada and a member for the Nevada Test Site Citizen's Advisory Board have expressed concerns over the regulatory classification of the Operable Unit 4 remedial wastes, as discussed in the Operable Unit 4 Feasibility Study/Proposed Plan - Draft Environmental Impact Statement. More specifically, the State of Nevada suggests that the Operable Unit 4 remedial wastes are "mixed wastes" [i.e., Resource Conservation and Recovery Act (RCRA) hazardous and radioactive waste] rather than "by-product material" as defined by the Atomic Energy Act (AEA), Section 11(e)(2), excluded from being a RCRA hazardous waste. The CAB stated that, "Based on the presence of RCRA regulated metals and organics in the waste, we are concerned that the waste contains both hazardous and radioactive components." Accordingly, the State of Nevada contends that the hazardous components of the Operable Unit 4 wastes are subject to regulation and control by an EPA-delegated state having such authority. (Commentors: E, O)

Response: The State of Nevada's comment concerns the classification of K-65 and Silo 3 material; specifically with respect to its regulation as mixed waste. The following response first discusses in general the issue regarding the classification; secondly, the response addresses specific State of Nevada concerns described in the letter.

(a) General Discussion

The material contained in Silos 1 and 2 (K-65 material), and Silo 3 is by-product material or residue resulting from the processing of uranium ore and is specifically exempt as defined from regulation as solid waste under RCRA 40 CFR §261.4(a)(4). The referenced exclusion applies to"... source, special nuclear or by-product material as defined in the ... AEA..." The AEA in part defines by-product as: ...the tailings or waste produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content. [AEA Section 11(e)(2)]. Since a material must first be a solid waste in order to be a hazardous waste, and since the material is excluded from regulation as solid waste, the subject material cannot be considered hazardous waste.

The silos contain only residues from the chemical extraction (beneficiation) of uranium from ores; no other solid or hazardous wastes were added to the silos or to the residues. Therefore, the contents of Silos 1, 2, and 3 are pure "by-product materials" by definition, and not solid wastes or hazardous wastes subject to regulation under RCRA. The metals found in the material were present in the natural ore, and were unintentionally extracted from the parent ore along with the uranium during the process of beneficiation, becoming more concentrated in the residue after the uranium was removed. The presence of naturally occurring metals is expected in by-product material, and does not invalidate either the definition or the exclusion. No metals from a non-ore source were added to the stream at any point in the beneficiation process; also, no hazardous waste or waste constituent was added or created at any time during the beneficiation process. The fact that several metals in the material fail the RCRA toxicity characteristic leaching procedure (TCLP) does not cause the material to become subject to RCRA regulation due to a hazardous waste characteristic, since the metals are not from an external source, but are associated with the parent material (whose residues, including any ancillary metals, are excluded from the definition of solid waste).

(b) Specific State of Nevada Comments and Responses

1. Comment: The comment refers to "...thorium mill tailing waste, which is admitted to be mixed waste....

Response: The comment is unclear, since there is no reference to any admission that the material is mixed waste. The FS/PP-DEIS does not claim the material is mixed waste. Rather, the residues in the silos are by-product material from the processing of ore material for its source material, primarily uranium. The by-product material is not itself a mixed waste, nor is it mixed with a solid or hazardous waste which would cause the material to be considered a mixed waste. As stated in the document, while they are not considered applicable as ARARs for the management of this material, various sections of RCRA have been included in the Operable Unit 4 FS/PP-DEIS as relevant and appropriate requirements for the management of this material during CERCLA remediation, due to the similarity of this material to RCRA characteristic hazardous waste. The adoption of various RCRA ARARs in the CERCLA documents does not confer or waive authorities agencies may have to regulate the silo material under RCRA.

2. Comment: "In 1987, DOE promulgated regulations (10 CFR §962.1) stating that RCRA hazardous waste, mixed with by-product material falling under the category defined in the AEA 142 USC 2014(e)(1)], would be subject to regulation ...." "However, the by-product material falling under the category given in 42 USC 2014(e)(2) that was mixed with RCRA hazardous waste, ... would not be subject to regulations by EPA...." " ....under the Federal Facility Compliance Act (FFC Act), Congress defined mixed waste to mean `waste that contains both hazardous waste and source, special nuclear, or by-product material ...' This definition shows no distinction between the two categories of by-product material mentioned above. Hence, the attempted exemption from hazardous waste regulations of the hazardous components of mixed waste containing by-product material ... has been invalidated."

Response: The DOE Final Rule in 10 CFR §962, promulgated in the May 1, 1987 Federal Register (52 FR 15937) for clarification of the term "by-product material," was limited in scope to by-product material as defined under 42 USC 2014(e)(1) meaning "radioactive material ... yielded in, or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear material." An example would be reactor fuel reprocessed for its enriched uranium. This rule does not affect materials that are defined as by-product material under Section 11(e)(2) of the AEA ("tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content"). The silo material falls into this second category.

DOE Order 5400.3A further clarifies the DOE interpretive rule referenced above:

"DOE interprets these definitions to mean that whenever any hazardous waste identified or listed in 40 CFR §261 is inadvertently mixed [emphasis added] with any source material, special nuclear material, or by-product material, the hazardous waste component is subject to regulation under Subtitle C of RCRA. The May 1, 1987 Federal Register notice did not affect materials that are defined as by-product material under Section 11(e)(2) of the AEA."

DOE Order 5820.2A contains definitions consistent with the above. Chapter IV, Management of Waste Containing AEA 11(e)(2) By-product Material and Naturally Occurring and Accelerator Produced Radioactive Material, specifies:

"By-product 11(e)(2) ... mixed [emphasis added] with the Resource Conservation and Recovery Act hazardous chemicals, shall be managed consistent with both the Resource Conservation and Recovery Act and 40 CFR Part 192."

The FFC Act, DOE Order 5400.3A, and DOE Order 5820.2A are consistent in their interpretation of the definition of mixed waste. The FFC Act simply reiterates that hazardous waste mixed with source, special nuclear, or by-product material is subject to dual regulation under both the AEA and RCRA, and has no bearing on Operable Unit 4 by-product material, since it is not mixed with a solid or hazardous waste (see General Discussion). The K-65 and Silo 3 material consists of only by-product material as defined under Section l l(e)(2) of the AEA, and is therefore subject to the solid waste exclusion under RCRA.

3. Comment: "...EPA delegated to the states regulatory control over all maxed wastes without regard to specific radionuclide content ... consistent with the expression of Congressional intent in defining mixed waste under the FFC Act (see 51 FR, July 3, 1986, 24504-24505)..

Response: In the referenced July 3, 1986 Federal Register notice, EPA is requiring that states seeking authorization to regulate under RCRA the "hazardous component" of radioactive mixed waste revise their programs (if necessary) and demonstrate statutory authority to regulate said "hazardous component." This notice was issued prior to the DOE interpretive rule of May 1, 1987. Although "hazardous component" is not expressly defined, the notice is consistent with previous definitions, and implicitly restates the definition of mixed waste as "wastes containing both hazardous waste and radioactive waste.. Again, this Federal Register notice does not detract from the stated position, since the Operable Unit 4 silo material consists solely of by-product material, and is not mixed with a solid or hazardous waste that would be subject to state regulation.

In summary, the Operable Unit 4 silo materials are expressly by-product material excluded from RCRA regulation under 40 CFR §261.4(a)(4), on the basis of "tailings or waste produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content" [AEA Section 11(e)(2)].

NOTE: While not applicable as an ARAR for the management of this material, various sections of RCRA have been included in the FS/PP-DEIS as relevant and appropriate requirements for the management of this material during CERCLA remediation, due to the similarity of this material to RCRA characteristic hazardous waste. The proposed alternative for remediation of this material includes treatment by vitrification, which will remove the "toxicity characteristic" due to the inadvertent presence of various metals in the material. The adoption of various RCRA ARARs in the CERCLA documents does not accede the authority of RCRA to regulate the silo material; these ARARs, among others, are selected on the basis of existing regulatory standards and management practices to be followed during remediation to ensure adequate protection of human health and the environment.

Issue 5 - Off-Site Transportation of Waste to Nevada Test Site

Several members of the local community expressed concerns related to the transportation of the Operable Unit 4 treated wastes from the FEMP to the Nevada Test Site (NTS). One individual preferred rail shipments over truck transportation, citing that truclc transportation is much more dangerous. Others requested more details on transportation (i.e., packaging specifications, and special handling requirements and precautions) and details related to notification when shipments will occur. (Commentors: A, F and Q)

Response: The preferred remedy for Operable Unit 4 requires a combination of rail and truck transportation for the shipment of treated silo residues off site for burial at the NTS. Currently, there are no direct rail lines into the NTS. The treated material would be transported from the FEMP by rail to either a point near Las Vegas, Nevada, or one of the areas north of Las Vegas. From either location, the waste contains carrying the treated material would be transferred to trucks for transportation ova roads to NTS. Consistent with regulatory requirements, the DOE will provide proper notification to all affected parties, including emergency response teams, when off-site shipments begin.

Additionally, the DOE is engaged in a program to optimize a container design to meet specific performance requirements for a shipping/burial container and to provide additional protection to workers and the public, for the eventual transport and disposal of the treated Operable Unit 4 wastes to be conducted between the FEMP and the NTS. One of the program's goals are focussed upon the viability of utilizing recycled contaminated scrap metal and other forms of metal for the fabrication of waste containers.

The success of the container investigation will be measured on the basis of achieving a balance of key design parameters and requirements such as:

! vitrified product mixture design
! final waste form of vitrified product
! waste loading of vitrified product
! waste additives of vitrified product
! packaging design
! shielding of package
! shipping limitations
! United States Department of Transportation (DOT) requirements
! NTS Waste Acceptance Criteria
! cost

The optimized container design will be modelled in an effort to minimize the estimated short-term risks posed to public by transporting the Operable Unit 4 wastes in the container.

Issue 6 - Monitoring of Remedial Actions Several members of the local community and the Ohio EPA expressed concerns that "real-time" monitoring should be implemented during the entire remedial action process. It was recommended that the implementation of "real-time" monitoring should be integrated into short-term remedial actions such as process controls, project specific health and safety procedures, emergency alarm systems, standard operating procedures, and emergency response procedures, as well as, long-term actions involving disposal and maintenance. Additionally, it was requested that information gained from "real-time" monitoring and related activities should be made readily available to the public. (Commentors: A, B, D, G, H, J and R)

Response: As part of the remedial design activities for the Operable Unit 4 remedial actions, a preliminary and final safety assessment will be conducted by DOE to establish the safety basis and design objectives for the construction and the operation of all remedial facilities. The safety basis includes those measures (i.e., procedures, training, monitoring equipment) necessary to ensure that facilities will be constructed and operated in a safe manner and in compliance with applicable or relevant and appropriate requirements.

It is the DOE policy in its conduct of operations to require facility operations procedures to be developed and adhered to during all remedial actions. Training of personnel to those procedures will be paramount to ensure safe conduct of all operations. The FEMP has developed and maintains the necessary emergency plans and procedures to adequately define the emergency management program, provide guidance for all emergency responders, proper notification of the public, ensure adequate monitoring and performance for critical systems, and to meet all regulatory requirements.

The use of "real-time" monitoring is an integral part of this process and will vary in degree for each system or action to be consistent with the safety assessment recommendations and comply with applicable or relevant and appropriate requirements. For example, some systems may require 24-hour "real-time" monitoring (i.e., fire protection, meteorological stations, perimeter air monitoring stations, radon treatment system) while others may only require "real-time" monitoring during normal operations (i.e., air emissions controls, waste water discharge, vitrification process controls, disposal facilities etc.). These features will all be developed and included in the remedial design and remedial action packages for review by the public, EPA, and Ohio Environmental Protection Agency (OEPA). Likewise, "real-time" monitoring data will be made available to the public through the Public Environmental Information Center.

Issue 7 - Impacts to Sites of Archeological and Historical Importance

The Ohio Historical Preservation Office (OHPO) expressed two areas of concern for the identified Operable Unit 4 remedial actions. Due to the FEMP site's proximity in an archeological sensitive area, the first area of concern is the potential for impacts to archeological sites. Secondly, under the current criteria and regulatory guidelines, the FEMP site itself is eligible for inclusion in the National Register of Historic Places, thus the proposed demolition of the silos, or any other structure or facility, could have an adverse effect on the FEMP site. The OHPO recommends the development of a programmatic agreement to address these sitewide and Operable Unit 4-specific historic preservation concerns. (Commentor: I)

Response: It is recognized that the FEMP site does lie in an archaeologically rich area and sitewide remedial activities will result in many ground disturbing and demolition activities. The DOE has effectively coordinated with the OHPO on several projects at the Fernald site in the past. Therefore, until the programmatic agreement has been developed between DOE and the OHPO, individual activities (e.g., the construction of support facilities) will continue to be coordinated with the OHPO.

In response to the second area of concern, it is further recognized that the FEMP site as a whole has recently been determined to be eligible for inclusion on the National Register of Historic Places. Therefore, appropriate steps will be taken to coordinate with the OHPO all activities involving the demolition of structures. The DOE will be pursuing a programmatic agreement with the OHPO in the near future. However, until such an agreement can be put in place, DOE will be coordinating with the OHPO office on an individual project-by-project basis.

Appropriate coordination activities associated with the remediation of Operable Unit 4 and the demolition of structures on the site will be carried out with the OHPO.

Issue 8 - Future Land Use at the FEMP

One member of the public expressed concern over any future development of the FEMP site (i.e., industrial park) which would attract large concentrations of humans, in the event environmental problems would happen to develop in the future (i.e., similar to Love Canal). (Commentor: F)

Response: The DOE, EPA, and OEPA are closely working with the local community (i.e., FRESH) to provide technical guidance to participating community members, in an effort to logically reach a balanced decision regarding the most feasible future land use(s) for the FEMP site. The Operable Unit 4 soil remediation cleanup levels were established with the assumption that in the future, the federal government would maintain ownership of the Operable Unit 4 area.

Issue 9 - Impact to Natural Resources

Members of the public expressed concern over the potential impact from the remedial actions to natural resources surrounding the FEMP site (i.e., wetlands, migratory birds, etc.), and the mitigative measures being taken by the DOE to minimize their effect. (Commentors: B and F)

Response: The end-use of the FEMP site is currently under consideration by the Fernald Citizens Task Force. This task force, based on input from the public and various stakeholders, will make a recommendation to DOE as to what the end-use of the Fernald site should be. This comment will be forwarded to the task force for their consideration. The task force's recommendation will play a key role in determining what happens at the site after remediation.

Depending on the types of environmental impacts that occur during remediation, it is possible that habitats may need to be created as mitigative measures. The specific issue of the need for creating wetlands is currently being evaluated by DOE and Fernald Environmental Restoration Management Company (FERMCO) and will be discussed with the stakeholders and formally addressed in the Operable Unit 5 (Environmental Media) Feasibility Study Report and Record of Decision.

Issue 10 - EPA Promulgation of Residual Soil Standards for Radionuclides

One local resident inquired whether the residual soil radiation levels, which the EPA has not yet published in the Federal Register (originally scheduled to be published in March 1994), could possibly impact the remediation decisions in Operable Unit 4. (Commentor: C)

Response: Residual soil standards for radionuclides are currently being finalized by the EPA. The EPA has issued a draft proposal which recommends the establishment of an effective dose limit of 15 mrem/year from residual soil radiation. Until the standards are finalized and promulgated by the EPA, it is uncertain whether they will impact Operable Unit 4. Radionuclide cleanup levels have been established for Operable Unit 4 which approach background concentrations for nearly all radionuclides. When the residual soil standards for radionuclides are promulgated by the EPA, a review of their impact upon the Operable Unit 4 soil remediation will be conducted. Soil cleanup levels for Operable Unit 4 will be modified as directed by the EPA.

Issue 11 - Air Emissions from Remedial Actions

One local resident, who lives downwind of the FEMP site, expressed concerns over the particulate matter and off-gases which could be emitted through the exhausts of the Operable Unit 4 vitrification process. Specific concerns were noted related to the performance of comprehensive site-wide air modeling which includes the Operable Unit 4 vitrification facility contributions to sitewide emissions and the quantification of subsequent risks to the local "downwind" community. (Commentor: K)

Response: Air pathway monitoring focuses on the airborne pollutants that may be carried from the Fernald site as a particulate or gas and how these pollutants are distributed in the environment. Stack and building vent emissions are obvious sources of pollutants, but dust from construction and remediation activities, waste handling, and wind erosion are also important potential sources. The form and chemical makeup of pollutants influence how they are dispersed in the environment as well as how they may deliver radiation doses. Airborne pollutants are subject to whatever weather conditions exist.

The meteorological data gathered at the FEMP site are primarily used to evaluate climatic conditions at the site. Wind speed and direction, rainfall, and temperature play a role in predicting how pollutants are distributed in the environment. The Fernald Environmental Monitoring Program routinely uses atmospheric models to determine how airborne effluents mix and disperse; these models, in turn, are used to assess the impact of operations on the surrounding environment, in accordance with DOE requirements. Based upon modeling results, risks to the public are calculated based upon exposure from the pollutants emitted from the FEMP site. The 1992 Fernald Site Environmental Report provides detailed breakdown of sitewide emissions, doses to the public, and their associated risks. This report is updated annually and may be available in the Administrative Record.

To date, computer modeling for expected radionuclide emissions from the proposed vitrification facility has not been conducted due to insufficient engineering design data. However, during remedial design, when these design data become available, this information will be entered into the appropriate air models to determine compliance with 40 CFR §61 Subpart H for radionuclides, including radium under the Clean Air Act. In addition, Ohio Administrative Code (OAC) 3745-31 05(A)(3) requires the use of Best Available Technology (BAT) to control process emissions. Compliance with the requirement to employ BAT will be determined by evaluating, according to the Ohio Air Toxics Policy (OATP), emission data collected from performance testing of the Operable Unit 4 vitrification facility.

Modeling will be conducted on the vitrification facility both prior to startup and during operation. The preliminary modeling will provide estimates of dose levels based on engineering design and expected removal efficiencies. Corroborative modeling conducted during operation will be based on actual data collected during stack performance testing, and will verify engineering design and compliance with the regulatory standard. Risks associated with these dose levels will be evaluated and compared to the other alternatives. Upon comparison a determination will be made to implement design criteria to minimize risk associated with the vitrification facility or if necessary to amend the selected alternative to one which poses less of a risk to the surrounding community.

Air emission modelling specific to the Operable Unit 4 vitrification processing facility will be performed as part of the remedial design process, to ensure that the vitrification facility is designed to meet these air emission ARARs and pertinent DOE Orders. In addition, portable air monitors will be strategically located around the perimeter of field activities during construction of remedial facilities. The air monitors will provide real time data regarding the effectiveness of controls to mitigate fugitive dust emissions.

Issue 12 - Determination of Risk Levels

A local resident questioned the reason the CERCLA elected to use such small risk levels as 10-6 (one in a million). In addition, the differences in methodologies like Health Effects Assessment Summary Tables (HEAST) and Biological Effect of Ionizing Radiation result in "vast orders of magnitude" differences in estimated risks. (Commentor: C)

Response: In accordance with the NCP (40 CFR 300), Operable Unit 4 is required to comply with the requirement that the excess risk, posed to humans exposed to carcinogenic materials in Operable Unit 4, would not be greater than one in ten thousand to one in a million. The lower bound of the range, one in a million (10-6) incremental risk, is the most desired level of residual risk to be posed by a clean-up action. This risk refers not to "fatal" cancer risk but the risk of the induction of incremental cancers, over and above the normal risk of contracting cancer, during one's lifetime. Operable Unit 4 is also legally required to utilize the methodologies defined by the United States Environmental Protection Agency for calculating the cancer risk posed by Operable Unit 4.

Issue 13 - Compliance with DOT Transportation Regulations

The U.S. Department of Transportation (DOT) provided two comments regarding compliance with DOT regulations.

(a) The first comment was related to classification of the materials as Low Specific Activity (LSA) and stated, "We [DOT] believe the expected physical form of the material transported will result in the radiological risk to the public being equal to or less than most LSA shipments transported in the Country. However, from Volume Two, Appendix A, Table A.1-1, it appears that the activity per gram of material for some of the package contents might exceed the limits for LSA materials in 49 CFR 173.403(n)."

(b) The second comment expressed concern with the sampling and analysis to be performed prior to shipment. The comment stated "After material vitrification, the external radiation dose rates will clearly be the indications of the most significant radiological hazards of the materials during transportation. However, since the identity of the radionuclides and the activity of the content in each package is required by the regulations, documentation with technical reasoning will be needed to relate the results of pre-vitrification radioassays to the contents of the packages." (Commentor M)

Response:

(a) The initial classification and container selection of the vitrified materials as LSA was used to perform cost estimates for the remedial alternatives evaluated in the FS for Operable Unit 4. These cost estimates were developed with an intended accuracy of plus 50 percent/minus 30 percent as required by CERCLA. Therefore these cost estimates were considered adequate for alternative evaluation. Since the initial distribution of the FS/PP-DEIS, the FEMP has initiated a study which will further specify the DOT classification of the vitrified material and container types required for shipment of the vitrified material. The final selection of container type is contingent upon several factors, including; the Curie content of the container, its classification under DOT regulations, the ability of the container to reduce external dose rate, and the acceptance of the container by the Nevada Test Site.

(b) Demonstration of compliance with regulations is the basis for the sampling and analysis program to be developed for Operable Unit 4 remediation. Sampling and analysis will be performed on the vitrified gems 1) to assure compliance with waste disposal requirements, 2) to demonstrate success of waste treatment, 3) to assure compliance with DOT requirements, 4) and to complete waste characterization of the vitrified materials. Specific parameters for testing will be determined in the Project Specific Sampling and Analysis Plans to be prepared during Remedial Action. The selection of parameters for analysis will include those which will demonstrate compliance with the activity limitations for containers per DOT regulations.

Issue 14 - Consideration of Disposal Sites for the K-65 Material On June 24, 1994, DOE received significant comments from a member of the Nevada Test Site Citizens Advisory Board (CAB). The CAB stated that the Operable Unit 4 FS/PP-DEIS documents did not discuss the full range of possible alternatives (e.g., disposal at Hanford, reprocess to recover materials, dispose of all mataial at the NTS). The member of the CAB further questioned "...Why were these options rejected? What is the full list of options initially considered and why was each option rejected?" (Commentor: O)

Response: Identification, screening, and evaluation of potentially applicable technologies and process options are key steps early in the FS process. The primary objective of this phase of the FS is to develop an appropriate range of remedial technologies and process options that will be developed into preliminary remedial alternatives. The criteria for identifying potentially applicable technologies are provided in EPA guidance and in the NCP. There is strong statutory preference for remedies that will result in a permanent solution; a significant decrease in toxicity, mobility, or volume; and provide long-term protection as identified in Section 121 of CERCLA, as amended. The primary requirements for the final remedy are that it be both protective of human health and the environment and comply with applicable or relevant and appropriate regulatory requirements.

The Operable Unit 4 FS/PP-DEIS presented information to support the selection of the most appropriate remedial alternative. The broad range of alternatives considered for remediation in the FS/PP-DEIS were developed in accordance with EPA guidance by following a series of logical steps that involved developing, in succession, more specific definitions of potential remedial alternatives. The steps included the following:

! Development of contaminant- and media-specific remedial action objectives (RAOs) and preliminary remediation goals (PRGs).

- Identification of general response actions (GRAs).

- Identification of volumes and/or areas of waste media to be addressed.

- Identification and screening of remedial technologies and process options.

- Evaluation and screening of process options within each technology.

- Assemblage of a wide range of remedial alternatives using the selected process options within each remedial technology.

- Evaluation of initial screening to determine which alternatives will be analyzed more fully in the detailed analysis phase of the FS.

The detailed analysis of alternatives was performed in Section 4 of the FS on those alternatives which were retained through the preliminary screening of alternatives step described above. The detailed and comparative analysis consisted of the analysis and presentation of the relevant information needed to allow decision makers to select a remedial alternative.

The Operable Unit 4 FS/PP-DEIS considered several disposal options for each of the on-property and off-site disposal technologies evaluated for the K-65 material as follows:

On-Property Disposal Technology
- Engineered Disposal Facility (Below-grade)
- Above grade Disposal Vault

Off-Site Disposal Technology
- New Facility within 483 km (300 mi) of the FEMP site
- New Facility Adjacent to the Site
- Permitted Commercial Disposal Site
- Nevada Test Site

In addition, in-situ and no-action alternatives were considered and evaluated as potential disposal alternatives. Sections 2.6.7.2 and 2.6.7.3 of the Operable Unit 4 FS discuss these representative options and the results of their preliminary screenings. Subsequently, repromulgation of 40 CFR Part 191 led to changes in the list of relevant and appropriate requirements affecting on-property disposal as discussed in Attachment C.II.

It is the DOE Defense Waste Management Policy at the Nevada Test Site, "...to approve generators and to receive, store and dispose of radioactive wastes generated by DOE defense programs in a manner consistent with DOE Order 5820.2A, "Radioactive Waste Management," and applicable federal, state, and local regulations and requirements."[1] Chapter III of DOE Order 5820.2A provides that low-level waste should go to a DOE low-level waste disposal site, such as the NTS. This policy ensures that low-level wastes will be handled properly in accordance with applicable standards and DOE guidelines. Exemptions from the DOE Order to allow shipments to commercial disposal facilities can be granted by the U.S. Department of Energy Assistant Secretary for Environmental Management on an ad hoc basis. Fernald has made shipments of waste in the past to the Nevada Test Site and to the commercial facility operated by Envirocare, Inc. in Clive, Utah.

1U.S. Department - Nevada Field Office, June 1992, Nevada Test Site Defense Waste Acceptance Criteria, Certification, and Transfer Requirements, Publication NVO-325, Rev. 1, Page 1.

In this case, however, the Operable Unit 4 vitrified silo wastes from Fernald do not meet the waste acceptance criteria for existing commercial facilities. The U.S. Department of Energy Office of Environmental Restoration asked for and is in the process of receiving a determination by the U.S. Department of Energy Office of Waste Management that the silo wastes constituted a small quantity of by-product material under Chapter III of DOE Order 5820.2A and therefore, may be disposed at a DOE low-level waste disposal site, such as the Nevada Test Site. Also, it has been a long-standing DOE policy that "defense related wastes" would be disposed at the Nevada Test Site and non-defense related waste disposed at Hanford.

That option, which is the preferred alternative, has been evaluated in this environmental impact statement as a potential alternative for waste disposal, along with a potential option for commercial disposal. Disposal at another DOE site, such as Hanford, was considered by DOE to be less feasible than shipment to the NTS, given past experience with shipping legacy wastes from Fernald to the NTS, which has been ongoing since 1985. In addition, an appropriate disposal facility is not currently available at Hanford to receive the Operable Unit 4 waste.

The reprocessing of silo wastes to recover radiological or inorganic constituents was determined not to be feasible due to poor treatability test results involving chemical separation techniques.

It should be noted that all of the Operable Unit 4 remedial wastes (i.e., Silos 1, 2 and 3 residues, contaminated soil and debris) were considered for disposal at the NTS. However, it was determined that only treated silo residues should be disposed at the NTS under the Operable Unit 4 FS/PP-DEIS (although disposal of contaminated soil and debris is to be determined in subsequent RODs).

The selection of the NTS for disposal of Operable Unit 4 waste is supported by a process option evaluation presented in Appendix B (Description of Technologies and Process Options) of the FS/PP-DEIS. This evaluation concluded that based on considerations such as geology, demographics, levels of precipitation, and depth to groundwater the NTS provided the best location for disposal. Also, the results of treatability studies conducted on the vitrified waste form indicate that the vitrified waste fully satisfies current NTS waste acceptance criteria and in general would provide a high level of long term protectiveness when disposed at the NTS.

Issue 15 - FEMP Waste Disposal Program

On June 21, 1994, DOE received a package of 174 postcards from Citizen Alert. Three additional postcards were received on July 5, 1994. The majority of the postcards were from concerned citizens of Nevada expressing their comments related to the shipment and disposal of Fernald waste at the NTS. One of their comments stated that, "...the more than 300,000 cubic yards of radioactive waste consisting of uranium, thorium and radium among other radionuclides, should be kept on-site in containers adequate to protect the local populace. Nevadans should not be required to accept additional risk on top of that already present at the Nevada Test Site." (Commentors: P1-P177)

Response: As part of the FEMP Waste Disposal Program, disposal of waste at the NTS is only one of several disposal locations being considered for waste resulting from the remediation of the Fernald site. Other disposal locations include both on-site disposal and commercial facilities.

The overall remediation of Fernald is expected to generate over 2.6 million cubic yards of waste requiring treatment and/or disposal. Of the estimated 2.6 million cubic yards, 1.4 million cubic yards are to be managed at the Fernald site, 900,000 cubic yards are to be shipped to commercial facilities, and 300,000 cubic yards may be shipped to the NTS (including approximately 5580 cubic yards of the Operable Unit 4 remedial wastes). Therefore, only about 10 percent of the waste from the remediation of Fernald might be shipped to the NTS. Additionally, these shipments would occur over a projected 30 year period.

Currently, Fernald is shipping low-level waste to the NTS at a rate of about 18,000 cubic yards of waste per year (based on the most recent 6 year average). The projected rate for disposal of the Fernald remedial waste at the NTS is estimated at a rate of approximately 10,000 cubic yards per year, with the highest estimate for a single year being approximately 16,000 cubic yards for 1995.

Furthermore, the 300,000 cubic yard estimate is a highest case estimate which, in reality, may not happen. Fernald is marring an effort to minimize waste generation and to explore other disposal options, thereby minimizing waste requiring shipment to the NTS, as well as other locations. Disposal of waste at the NTS is utilized only when these options have been evaluated and determined unfeasible. These minimization efforts include recycling, decontamination for free-release of material, volume reduction through treatment, disposal of the waste on-site, and use of commercial disposal facilities.

Despite these efforts, the Operable Unit 4 FS/PP-DEIS has concluded after a detailed evaluation that approximately 5580 cubic yards of silo residues are more appropriately disposed at the NTS. This is driven by several factors, including the location of the Fernald site over a sole-source aquifer (State of Ohio regulations prevent the establishment of a disposal facility over a sole source aquifer); the close proximity of the site to large populations and agricultural land; and the lack of commercial disposal facilities which may accept these wastes. As discussed in the Operable Unit 4 FS/PP-DEIS, these wastes include the treated residues from Silos 1, 2, and 3.

The State of Ohio recognizes that the final disposition of some Fernald wastes may be on site. In a letter written to the U.S. EPA, the State of Ohio said: "Large volumes of contaminated construction and demolition debris, soil, fly ash and bottom ash, and possibly some solid waste will have to be disposed onsite at Fernald."

The disposal of some wastes at the NTS is one part of a balanced waste management effort for the Fernald remedial activities. Although Fernald is committed to the minimization of wastes and finding alternative disposal options for its wastes, Fernald proposes to rely on the NTS for disposal of certain wastes.

Issue 16 - Evaluation of Transportation Risks

On June 21, 1994, DOE received a package of 174 postcards from Citizen Alert. Three additional postcards were received on July 5, 1994. The majority of the postcards were from concerned citizens of Nevada expressing their comments related to the shipment and disposal of Fernald waste at the NTS. One of their comments stated that, "Transportation risks need to be thoroughly evaluated. (Commentors: P1-P177)

Response: The FS/PP-DEIS for Operable Unit 4, Section 4, contains a complete detailed analysis of all the remedial alternatives evaluated for off-site transportation of wastes, which included both long-term and short-term risks. The preferred remedy for Operable Unit 4 involves the transportation of the treated silo residues to the NTS by a combination of rail and truck. The material would be shipped exclusively by use of rail from the FEMP to Las Vegas, Nevada [a distance of 3562 km (2270 mi)], then by truck from Las Vegas to the NTS [179 km (111 mi)].

The FS/PP-DEIS for Operable Unit 4, Appendix D, contains a detailed discussion of the long-term and short-term risks associated with each remedial alternative which underwent detailed analysis. The RADTRAN IV computer code was used to evaluate potential short-term risks, including risks to the public during the transportation of the vitrified Silos 1, 2 and 3 material to the Nevada Test Site Through Sandia National Laboratory's TRANSNET system, RADTRAN IV simulates the transportation route, the length of time members of the public are exposed to radiation, and the dose equivalent delivered for the trip. This exposure is to members of the public sharing the road with the truck, people living along the rail and truck route, and people encountering the truck at truck stops The alternatives call for packaging the treated material in metal boxes meeting U.S. Department of Transportation packaging requirements of 49 CFR Part 173 The radiological impacts associated with the transportation of the waste to the NTS for disposal are summarized in Table C 4-2

TABLE C.4-2

IMPACTS TO THE PUBLIC DURING TRANSPORTATION OF VITRIFIED SILOS 1, 2 AND 3 WASTE TO THE NTS

ESTIMATED IMPACT	Transportation to the Nevada Test Site	
	Vitrified Silos 1 and 2 Material	Vitrified Silo 3 Material
Routine Transport		
RME Individual dose (mrem)	0.0085	0.00014
Risk-ILCRb	8.32x10-10	1.71x10-11
Transportation Accidents		
Public dose from radioactive material releases following truck accident, (person - rem)	1.9x10-5	3.8x10-6
Public dose from radioactive material releases following train accident, (person - rem)	0.026	0.0053
Truck Associated Injuriesa	0.013	0.0068
Truck Associated Fatalitiesa	0.0014	0.00074
Train Associated Injuriesa	0.15	0.077
Train Associated Fatalitiesa	0.038	0.020

a Nonradiologial impacts.
b ILCR - Incremental Lifetime Cancer Risk Above Background.

The estimated dose exposure and subsequent risks were calculated and reported as an incremental lifetime cancer risk (ILCR) to the public from the transportation of the vitrified Silos 1, 2 and 3 material to the Nevada Test Site. Consistent with the goals of CERCLA, it is desirable to have the risks resulting from remediation to fall within all ILCR range of 1 x 10-6 to 1 x 10-4 above background. For example, if a member of the public has an additional 1 chance in 1,000,000 of contracting cancer due to exposure to radiation during transportation, the probability of developing cancer is expressed as a 1 x 10-6 (1 in 1,000,000) risk. As presented in Table C.4-2, all short-term risks from exposure to radiation meet these criteria.

In addition to risks from the radiological exposure from the transportation of Silos 1, 2 and 3 material to the NTS, accidental injuries and fatalities are predicted to occur because trucks and/or trains would be used for material transportation to the Nevada Test Site. The following risk coefficients below were used to evaluate non-radiological risks to truck drivers and rail crews:

Driver/Crew	Truck	Rail
injury/mile	4.1 x 10-8	4.6 x 10-6
death/mile	2.1 x 10-9	4.6 x 10-8

Likewise, the following risk coefficients presented below were used to evaluate non-radiological risks to the public:

Public	Truck	Rail
injury/mile	1.2 x 10-7	6.8 x 10-6
death/mile	1.3 x 10-8	1.8 x 10-6

It should be noted that the risk coefficients for truck and rail transport are not strictly comparable, since far more waste is transported per mile of rail transport than per mile of truck transport. These risks parameters were used consistent with standard risk calculation methodologies as identified in the Final Risk Assessment Work Plan Addendum, (June 1992),[2] which referenced the aforementioned published statistics by the U.S. Department of Transportation Federal Highway Administration3 and U.S. Department of Transportation Federal Railroad Administration.4

As before, RADTRAN IV computer code was utilized to calculate the short-term impacts of injuries and fatalities. These impacts are also presented in Table C.4-2 for the transportation of Silos 1, 2 and 3 to the Nevada Test Site.

RADTRAN IV also assesses the impacts from accidental releases of the radioactive material in the transport containers. The code assesses the total impacts for eight accident severity categories. It assesses collective radiological impacts to the public from direct radiation exposure from contamination on the ground, inhalation of contaminants in a plume and resuspended from the ground, direct radiation exposure from contaminants in a plume, and ingestion of food grown in the contamination area. The impacts from a single truck and train accident are included in Table C.4-2.

Issue 17 - Socioeconomic to the Waste Receptor Community

On June 21, 1994, DOE received a package of 174 postcards from Citizen Alert. Three additional postcards were received on July 5, 1994. The majority of the postcards were from concerned citizens of Nevada expressing their comments related to the shipment and disposal of Fernald waste at the NTS. One of their comments stated that, "Socioeconomic impacts on the receptor community should be thoroughly evaluated and balanced against the desires of Ohio to move Fernald waste." (Commentors: P1-P177)

Response: The importance of evaluating the socioeconomic impacts of the Operable Unit 4 Remedial Action Alternatives on affected off-site locations is recognized by DOE. It is DOE's view that this issue has been adequately evaluated in the Operable Unit 4 FS/PP-DEIS.

Section 4.0 of the Operable Unit 4 FS/PP-DEIS provides a thorough discussion of the alternatives. For the alternatives that consider disposal at the NTS, impacts on socioeconomics wae evaluated.

2U.S. Department of Energy, June 1992, "Risk Assessment Work Plan Addendum," U.S. Department of Energy - Fernald Field Office, Fernald, Ohio.

3U.S. Dept. of Transportation Federal Highway Administration, Office of Motor Carriers, 1986, Accidents of Motor Carrier of Property, Publication No. FHWA-MC-88-008, DOT, Washington, DC.

4U.S. Dept. of Transportation Federal Railroad Administration, Office of Safety, 1988, Accident/Incident Bulletin, Publication No. 157, DOT, Washington, DC.

Population demographics, land use of areas adjacent to the site, and potential risks to the surrounding population are discussed. In addition, impacts on groundwater, soil and geology, biotic resources, etc., are also presented.

Additional discussion of the NTS is also provided in Appendix B of the Operable Unit 4 FS/PP-DEIS, Description of Process Options and Technologies. This discussion provides additional detail on the natural and socioeconomic characteristics of the NTS and the surrounding area. This information formed the basis for the impacts presented in Section 4.0 of the Operable Unit 4 FS/PP-DEIS.

Additionally, on August 10, 1994, DOE published a Notice of Intent to prepare a site-wide EIS for NTS (59 FR 40897). This notice invites the public to participate in the scoping process for the NTS EIS.

Issue 18 - Disposal of DOE Waste at the Nevada Test Site

On June 24, 1994, DOE received comments from a member of the Citizens Advisory Board for Nevada Test Site Programs which expressed concerns over the current decision process for considering DOE waste for disposal at the NTS. More specifically, the comment stated as follows:

The shipments of waste from Fernald are the first of potentially many other shipments to the NTS. Rather than marring decisions on a piecemeal basis, we want to see the full picture before we are asked to mane decisions on individual pieces. That is, we want to first consider the total impact of all of the waste that is being considered for disposal at the NTS. Following that, we want to consider each individual piece." (Commentor: O)

Response: A Notice of Intent to prepare a site-wide EIS for the NTS was published on August 8, 1994. The purpose of this Notice is to invite the participation of federal, state and local agencies, affected Indian tribes, and other interested persons in the process DOE will follow to solicit public comments on the proposed scope and content of the NTS EIS. The site-wide EIS will address the impacts of all waste disposal activities at the NTS. Shipments of waste generated from the cleanup of Operable Unit 4 are not proposed to begin until after the expected completion of the NTS site-wide EIS.

Issue 19 - Funding for Technical Oversight and Impact Mitigation

On June 24, 1994, DOE received comments from the Citizens Advisory Board for Nevada Test Site Programs which expressed their belief that:

(a) funds should be provided for technical oversight of waste management activities.

(b) the State of Nevada and affected Counties are entitled to impact mitigation payments as compensation for costs arising from management of this material. (Commentor: O)

Response: (a) The first issue regards funding for technical oversight. DOE currently has a program established for providing such funds. This program is detailed in an "Agreement in Principle, with the State of Nevada, one of several such agreements between DOE and the states in which DOE facilities are located. This agreement includes the provision of funding for technical oversight by the State of Nevada for waste management activities at the NTS.

(b) The second issue is related to providing impact mitigation payments for management of waste in Nevada to the State of Nevada and affected counties. Mitigation payments are associated with actions whose implementation will have significant impact on human health and the environment. Since no significant impacts are expected to result from the transportation and disposal of the vitrified Operable Unit 4 waste at the Nevada Test Site, no mitigation payments for management of the waste in Nevada are anticipated at this time.

C.5.0 SUMMARY OF COMMENTS NOT RESULTING IN ISSUES

Commentors A, B, D, G, H, and J inquired as to the possibility of covering the silos and ensuring pollution prevention measures are implemented during remediation. Through the remedial design process, appropriate measures will be evaluated, utilized, and monitored to maintain air emissions resulting from all remedial actions at or below the regulatory requirements.

Commentors A and H wanted assurance that waste from other sites would not be brought to Fernald's vitrification facility to be treated nor stored at the FEMP for future disposition. At this time, no plans have been made to treat waste from other DOE sites through the Operable Unit 4 Vitrification Facility or store materials at the FEMP. However, as part of a treatability study under the Uranium Soils Integrated Demonstration program, DOE is considering a program that would involve importation of uranium-contaminated soil samples from Portsmouth, Ohio to be tested at Fernald and returned to the point of origin. This study would be conducted as an extension of the current Minimum Additive Waste Stabilization (MAWS) program, which is part of Operable Unit 4 remediation program. These tests are an essential component of FEMP's ability to conduct necessary research in support of DOE technology development.

The purpose of doing this test work is to make use of the investment which DOE has already made in equipment and experience at Fernald; to produce valuable remediation information for a nearby Ohio site; and to avoid duplication of the resources already available at Fernald.

The pilot-scale soil decontamination work at the FEMP is part of DOE's Uranium Soils Integrated Demonstration, a DOE Office of Technology Development program aimed at developing and applying new and enhanced technologies by demonstrating them at one test site.

Currently, a proposed test plan is being circulated for review within DOE and FERMCO management to solicit comments on approach, feasibility and acceptability. No action has been taken or will be taken without stakeholder input.

Commentors D and G wanted to suggest the possibility of setting up a trust fund for monitoring and maintenance of the on-property disposal facilities. A trust fund would not be a viable option due to the manner in which money is budgeted and allocated to the FEMP cleanup. The United States Congress annually reviews and approves the funding that the FEMP will receive through the DOE for remediation activities. A trust fund which would cover the cost of future routine operations and maintenance would not be viable under the current budgetary process.

Commentor A asked how the vitrified silo residue waste form could emanate radon at the same rate as building materials, when the waste itself is much more radioactive. She also requested clarification on the interim storage process. The glass matrix of the vitrified Operable Unit 4 waste form retains radon much more efficiently than porous building materials such as concrete and masonry. Therefore, the Operable Unit 4 vitrified material releases radon at a similar rate of building materials despite the greater quantity of radon emanating radionuclides contained within the vitrified waste form.

Contaminated soil and debris would either be processed in accordance with the selected Operable Unit 5 (Environmental Media) and Operable Unit 3 (Production Area) remedy identified in the Operable Unit 5 and Operable Unit 3 ROD or placed in an interim storage facility to await the finalization of the disposal decisions for soils and debris under Operable Unit 5 and Operable Unit 3. The interim storage would be managed pursuant to the approved work plan for Removal Action 17 - (Improved Storage of Soil and Debris).

The decision regarding the final disposition of the remaining Operable Unit 4 contaminated soil and debris has been placed in abeyance to take full advantage of planned and in-progress waste minimization treatment processes. Further, this FEMP remedial management strategy enables the proper integration of disposal decisions on a sitewide basis. As planned treatment facilities become available under Operable Units 3 and 5 remedial actions, full consideration would be given to applying these systems to the inventoried contaminated materials from Operable Unit 4. Following the application of available waste minimization processes, the remaining Operable Unit 4 contamimated soil and debris would be disposed consistent with the selected remedies for Operable Units 5 and 3, respectively.

Commentor D wanted to know if the 250 acres calculated to be disturbed during thc implementation of the preferred alternative for Sub 2C included loss of habitat. Tbe 250 acres discussed in the Feasibility Study Report for Operable Unit 4 represents the cumulative sitewide acreage of land that will be disturbed as a result of the implementation of all five operable unit's preferred remedial actions. An estimated 220 acres out of the total 250 acres would be lost in the long term, with the remaining 30 acres only rendered temporarily unusable during the implementation of the sitewide remedial actions. Therefore, only 220 acres would be permanently committed as a result of implementing these remedial alternatives.

The State of Nevada (Commentor E) noted that," . . . the cost estimates of long-term storage/disposal of mixed waste at the NTS were not properly accounted for in the Draft EIS. The assumptions, for example, under which storage/disposal of mixed waste at the NIS could be considered "free" when compared to a commercial facility, were not presented in thc document. The cost for disposal of FEMP waste at the NTS are incurred by the FEMP. NVO-325 (Nevada Test Site Defense Waste Acceptance Criteria, Certification, and Transfer Requirements), Section 3.5 discusses the methods of payment which generators will use to cover the cost of disposal operations for their waste at the NTS. Specifically, NV0-325 states ". . . disposal charges are based upon the estimated volumes listed on their (generator's) "Three-Year Waste Shipment Forecast multiplied by the corresponding disposal charge per cubic foot. . ."

The "Three-Year Waste Shipment Forecast" is prepared annually by the generator and it estimates the quantity of waste to be shipped to NTS by that generator each year for the next three years. These forecasts are then used by the NTS to project operating costs for operations related to disposal of the waste for the upcoming years. Therefore, although the NTS disposal site is a non-commercial, non-profit government facility, the cost for operations is funded by the generators and is not provided "free of charge." It should be noted that, as stated in the response to Issue 4, the Opaable Unit 4 by-product material for disposal at the NTS is not mixed waste.

Commentor B questioned how NEPA was being addressed within these documents. More specifically, how NEPA volumes were being integrated into the CERCLA process for the Operable Unit 4 FS/PP-DEIS. When the Operable Unit 4 EIS process was initiated, it was DOE's policy to integrate the NEPA requirements into the procedural and documentation requirements of CERCLA whenever practicable. On June 13, 1994, the Secretary of Energy modified DOE's approach to National Environmental Policy Act (NEPA) compliance for actions taken under the authority of CERCLA. As a general policy, DOE will now rely on the CERCLA process for review of remedial actions to be taken under CERCLA, incorporating NEPA values into CERCLA documents to the extent practicable. DOE may choose, however, to integrate the NEPA and CERCLA processes for specific proposed actions. For Operable Unit 4 at the FEMP, DOE has chosen to prepare integrated CERCLA/NEPA documents. This decision was based on the longstanding interest on the part of local stakeholders to prepare an EIS on the restoration activities at the FEMP and on the recognition that the draft document was issued and public comments received. Therefore, an integrated Feasibility Study/Proposed Plan - Final Environmental Impact Statement (FS/PP-FEIS) has been completed which evaluates alternatives for the treatment and disposal of radioactive residues contained in storage silos at FEMP.

In accordance with both CERCLA and NEPA processes, these documents are made available to the public for comment. Public involvement is an important factor in the decision-making process for site remediation. Public comments will be considered in the selection of remedy for each operable unit, which will be presented in a ROD. Applying the integrated approach for CERCLA and NEPA, DOE plans to prepare and issue a single ROD to be signed by both DOE and EPA. The contents of the documents prepared for the remedial actions at the FEMP are not intended to represent a statement on the legal applicability of NEPA to remedial actions conducted under CERCLA.

Commentor Q provided twenty comments on the Proposed Plan. Some of these continents were addressed in the issue discussions presented in Section C.4.0 of this document. The remaining comments were basically requests for clarification of the technical content of the document and did not have significant impact on the document. The comments are distinguished by the letter and the response to the comments immediately follows.

(a,l) Comments: The responses to Comments "a" and "1" were similar in content and, therefore, have been combined. The comments are related to the differences in cost and implementation between alternatives with the same treatment technologies. The commentor stated that". . . there are variances in the capital cost for the same treatment alternatives with the only difference being on-site versus off-site disposal. What is the source of this variance?. Furthermore the commentor stated: ". . .comparison of remedial alternatives, state differences in implementing identical treatments with different disposal options. Is this difference related to transportation issues for off-site rather than on-site? Please explain these differences. Also Subunit C lists no treatment for all alternatives; please demonstrate why no treatment is acceptable.

Response: The variances of the capital costs are primarily due to the difference in the disposal methods. The on-site disposal alternative includes the capital costs associated with the construction of a disposal vault. The off-site alternative has no capital cost associated with the construction of the disposal vault, but does include capital costs associated with the transportation and disposal of the waste at the off-site disposal facility. The implementation of these alternatives is also affected by the same factors.

No treatment response actions were utilized in the development of alternatives for Subunit C waste (i.e., soils and debris). This decision is consistent with the FEMP site-wide waste management strategy. This strategy is designed to coordinate the disposal of similar waste between operable units. From a site-wide perspective, the estimated quantity of soils and debris requiring management by Operable Unit 4 in comparison with the total estimated quantity of soils and debris to be managed by Operable Units 5 and 3 respectively, is quite small. Therefore, as opposed to Operable Unit 4 developing its own treatments methods for soils and debris, the disposition of these wastes will be integrated with the disposal methods and any treatment methods developed by Operable Units 3 and 5.

(b,d) Comment: The responses to Comments "b" and "d" were similar in content and, therefore, have been combined. These comments are related to post-remediation monitoring and site reviews for alternatives which include on-property disposal. The commentor asked: ". . .EPA would review on-property disposal every five years in accordance with CERCLA requirements. Who and how often would a review be performed in other years?. and also asked: "Post remediation O&M cost are estimated over a thirty year period. What about the remaining years for which this material will require monitoring?"

Response: The EPA requires a five-year review under the CERCLA as follows ". . .if a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after initiation of the selected remedial action." The on-property disposal alternatives for Operable Unit 4 include the five-year reviews. The on-property disposal facility for the Operable Unit 4 materials would be designed to preclude the need for active operation, maintenance, and monitoring. However, during the active operational phase of the overall FEMP site remedial activities (approximately 30 years), the disposal facility will be monitored. It is anticipated that such operations, maintenance, and monitoring and associated costs would not be warranted (i.e., no water infiltration will have been observed) beyond that timeframe.

The Operable Unit 4 selected remedy has adopted preliminary soil cleanup levels with exhumed soils being placed into on-property storage, pending the establishment of final remediation levels and a disposition strategy through the Operable Unit 5 Record of Decision (ROD). The Draft Operable Unit 5 ROD is scheduled for submittal to the USEPA and OEPA on July 2, 1995. Since this soil disposition strategy has been adopted, it is not considered appropriate to specify in the Operable Unit 4 ROD the long-term operation, maintenance and monitoring requirements for any residual concentrations of hazardous substances in soils in the Operable Unit 4 footprint.

The Operable Unit 5 ROD will establish final remediation levels for soil and the associated long term operation, maintenance, monitoring and institutional requirements for the site. The scope and duration of these requirements will be consistent with the contemplated future land use for the FEMP property and the final remediation levels documented in the Operable Unit 5 ROD. Active operation, maintenance and monitoring for the soils staged in the interim storage facility are contemplated as part of the Operable Unit 4 remedy.

(c) Comment: "There is no mention of retri[e]vability of the materials which would be disposed of in the on-site dispasal vault. Is this option being considered, and if not, why?"

Response: The on-property disposal facility is designed with an intruder barrier and permanent markings to inhibit purposefill or inadvertent human intrusion of the facility's engineered protective features and to eliminate water infiltration. This design is utilized to provide permanent disposal of the wastes and does not include a means to readily retrieve the waste. Designing a means to easily retrieve the waste would compromise the integrity of the cap and would present an easier access for intrusion into the disposal facility.

(e) Comment: "Alternative 2B and 4B have an identical post remediation cost, with Alternative 4B being untreated. Please explain how cost can be the same for treated versus untreated materials disposed in an on-site vault?"

Response: Post-remediation cost cover the costs associated with the monitoring and maintenance of the disposal facility. The monitoring and maintenance requirements and the disposal facilities for both alternatives are the same. Therefore, the post-remediation cost associated with these activities are also the same.

(f) Comment: "There is discussions of interim storage. What is the estimated time for this interim storage?"

Response: The use of interim storage is identified for Subunit C alternatives waste only. Interim storage would be utilized only if the waste could not immediately be managed by the remedial alternatives selected for Operable Units 3 and 5. If interim storage is required, the duration of the storage would be contingent upon the schedule for implementation of the preferred remedy identified in the Operable Units 3 and 5 ROD. The interim storage would not exceed the date for final remediation of the FEMP site which is currently estimated to be completed in 30 years.

(g) Comment: "Alternative 2C states that the contaminated materials would be placed in bulk (without packaging) into the on-site disposal vault. Please expand on why this material would not be packaged and state the advantages/disadvantages of packaged versus unpackaged."

Response: The soils and debris considered for disposal into the disposal vault would be contaminated with relatively low levels of contamination. The disposal facility for the contaminated material from Alternative 2C would be designed to be protective of the environment without the use of packaging. The use of bulk disposal eliminates the unnecessary cost of the packaging and also reduces the cost of construction by requiring a much smaller disposal facility.

Comment: "It is stated that non-porous materials will be released from the site as uncontaminated per DOE Order 5400.5. Will this material be checked for contamination prior to release or just assumed to be uncontaminated and release?"

Response: As per DOE Order 5400.5, any material which has been used or stored in a radiation area is to be considered potentially contaminated. Prior to free-release of any potentially contaminated material, the material will be surveyed to determine whether the removable or total surface contamination is within specific limits as established in DOE Order 5400.5, NRC Regulatory Guide 1.86, and FEMP site procedures. The establishment of these limits is based on the primary objective to prevent an effective dose equivalent to the public in excess of 100 mrem per year. This standard is considered protective of public health and the environment.

(i) Comment: "Will wastewater generated during remediation be treated for non-radioactive contaminates prior to discharge in the Great Miami River? To what extent will radioactive and non radioactive elements be removed prior to discharge?"

Response: All waste water generated at the FEMP, including waste water generated during Operable Unit 4 remedial activities, is subject to compliance with the FEMP National Pollution Discharge Elimination System (NPDES) permit. The NPDES permit limits the amount of contaminants, both radioactive and non-radioactive, which may be discharged through waste water effluent into the environment. In compliance with the NPDES permit, all waste water generated from the remedial activities for Operable Unit 4 will be treated to comply with the FEMP NPDES permit standards.

(j) Comment: "A material variance in the cost associated with Subunit C exist between 3C.1 and 3C.2 with the only apparent difference being 3C.1 disposal at NTS and 3C.2 at Envirocare in Utah. Please explain this variance and if this is partially due to more stringent requirements at NTS, should these more stringent requirements also be required at a commercial facility? Which requirements is more protective? It is also stated that an exemption from DOE Order 5820.2A (this is transposed as 5280.2A in document, page 56) is needed to dispose at a commercial facility; has this been granted?"

Response: The variance in the cost between Alternative 3C.1 and 3C.2 is primarily due to the elimination of packaging for the Permitted Commercial Disposal Facility as opposed to the use of packaging for the NTS. The elimination of the purchase cost of the packaging and the reduction of required transportation significantly decreases the costs of Alternative 3C.2 as opposed to 3C.1. The NTS currently does not accept waste in bulk form (i.e., unpackaged railcar) and therefore, the disposal alternative for the NTS does not recognize the same cost savings. Because both disposal facilities operate within their permits, and the environments in which they are located are similar, both disposal facilities are considered equally protective.

An exemption from DOE Order 5820.2A, which excludes the use of cormnercial disposal facilities for DOE waste, has not been specifically pursued for the disposal of Operable Unit 4 remedial wastes. The evaluation of the alternatives in the FS/PP-DEIS, indicated that other alternatives were preferred over the alternatives which included the Permitted Commercial Disposal Facility. Therefore, a request to grant an exemption from this DOE Order was not required. However, exemptions from this order have been granted and commercial disposal facilities have been utilized for other FEMP wastes.

(c) Comment: "Will notification of these shipments be given to the areas involved in the transportation routes for both rail and truck, and what precautions for protection will be employed?"

Response: Response to this comment is provided in Issue 5 on page C-4-20.

(m) Comment: "Is there a potential for failure of the vitrified material has the radionuclides trapped continue to decay, and if so, what is that risk?"

Response: The weathering behavior of volcanic glass (a natural analog to the Operable Unit 4 vitrified product) can provide some measure of the long-term stability and durability of the vitrified product. Only very thin weathering rinds develop on volcanic glass over a period of several million years. The slowness in the overall degradation of a glass grain suggests that the diffusion coefficient or leachability index would remain relatively unchanged over time. Data on the long-term stability of vitrified material are not available, and the life expectancy of the vitrified product is difficult to estimate from short-term leach rates. However, on the basis of the longevity of volcanic glass and diffusion calculations, the vitrified product would be expected to withstand direct environmental exposure for thousands of years. Furthermore, past studies have shown that the decay of radioactive materials do not affect the durability of the vitrified product.

(n) Comment: "It states that the capital cost associated with the on-site disposal facility has been removed. Where is (will) this cost be accounted for?"

Response: This comment refers to a sentence in the Proposed Plan (page 67, line 6) which was erroneous and scheduled to be deleted from the text. However, this deletion was inadvertently overlooked and the sentence was left in the text. The capitol cost of the on-site disposal facility is included in the total estimated cost of the preferred remedy. This cost is identified in Table 9-1 of this document.

(o) Comment: "Line 14, page 67 reads ". . .results in significant a reduction in the volume. . . ," this would read better if the "a", preceded significant/rather than follow."

Response: This comment is duly noted. However, it has no significant impact on the document.

(p) Comment: "Please define the following statement (line 16, page 67) utilize permanent solutions to the maximum extent practical. What viable permanent solutions presently exist?"

Response: The intent of the statement" . . .permanent solutions to the maximum extent practical. . ." alludes to the fact that, based on available technology, this remedy provides the most feasible and permanent solution for the remediation of Operable Unit 4. A potential remedial alternative's ability to achieve long term permanence is one of nine criteria used to evaluate a remedy in terms of the risk remaining at the site after response objectives have been met. The primary focus of this evaluation is the extent and effectiveness of the controls that may be required to manage the risk posed by treatment wastes.

As discussed in the Operable Unit 4 Feasibility Study and Proposed Plan, the preferred remedy (removal, vitrification of the waste and offsite disposal at the Nevada Test Site) would be the most effective based on treatability studies conducted on the silo residues which demonstrated that vitrification would be effective in reducing radon emanation, radionuclide leachability, and significantly reducing the residue volume by approximately 50 percent. Off-site disposal at the NTS would provide a greater certainty than on-property disposal over the long term that the treated residues would not affect human health and the environment.

(q) Comment: "Basis for stating long-term environmental impacts of permanent disposal at NTS are minor and no long-term impacts of biota expected from disposal activities at NTS. It is stated that to reduce U-238 to essentially background is not feasible; it also states that it is assumed that the federal government retain ownership of the FEMP site to consider clean-up protective. While I do not have a problem with these statements, it does bother me that no formal statement has been made publicly concerning this. These two statements present future land use constraints which must be addressed. Why hasn't the DOE adopted a formal position concerning this issue and communicated this to both the Fernald Citizens Task Force and the community?"

Response: The DOE and the EPA recognize that future land use for the FEMP site is currently under consideration by the Fernald Citizens Task Force and is actively involved in and supports this effort. However, due to the stipulations of the Amended Consent Agreement, Operable Unit 4 is required to put forth a remedy for cleanup of soils within the operable unit boundary prior to completion of the Fernald Citizens Task Force effort.

As discussed in the Proposed Plan, Section 5.4.1, the preferred remedy for Operable Unit 4 requires cleanup of contaminated soils to the proposed remediation levels presented in Table 5-2. In addition to this, it is indicated that these cleanup levels for soils may be adjusted to lower values, if necessary, to insure protectiveness of human health and the environment. The level of protectiveness required by the soils will be dictated by the final land use selected for the entire FEMP site, including that for Operable Unit 4, by the Citizens Task Force, and the ongoing feasibility study modelling efforts being performed by Operable Unit 5. Factoring in the Fernald Citizens Task Force recommendations, Operable Unit 5 will evaluate and determine the final cleanup levels required for soils on a site-wide basis. Accordingly, the Operable Unit 4 FS/PP-DEIS recommends that the decision for final disposition of the contaminated soils be put in abeyance until the Record of Decision for Operable Unit 5 is issued, at which time the final soils cleanup levels will be established.

(r) Comment: "Line 13, page 76 reads". . .would not be. . .", should that read . . . would not be..."?

Response: This comment is duly noted. However, it has no significant impact on the document.

(s) Comment: "It states the on-site, above-grade disposal facility would be designed for a 1000 year life with no active maintenance. What is the half-lives or duration for which the radionuclide and chemical contaminants are a threat to the environment; do they exceed 1000 years? Also explain why no active maintenance is assumed for 1000 years?

Response: The half-lives of the radioactive constituents in the Operable Unit 4 waste range from 3 to 4 days for Radon-222 to over 1.4 x 1010 years for Thorium-232 well in excess of 1000 years.

On-site disposal of contaminated soils and debris in an above-grade disposal facility was evaluated in the Operable Unit 4 Feasibiliq Study (FS) and also presented in the Proposed Plan (PP). For purposes of the FS/PP, tbis disposal facility would be designed for a life of 1000 years. This vault would be designed to preclude the need for long-term active maintenance for the duration of its design life of 1000 years. An assessment of the risks to human health, presented in Appendix D of the Operable Unit 4 FS, indicates that for the extended trespasser the residual risk from soil remaining in Operable Unit 4 in addition to risks posed by disposal of contaminated soils and debris in this facility would be well within the required risk range of 1 x 10-4 to 1 x 10-6. However, it should be noted that the final disposition of soil and debris will be determined by the Records of Decision (RODs) for Operable Units 3 and 5. In accordance with the requirements of CERCLA, the Operable Units 3 and 5 RODs will define the appropriate level of protectiveness required for final disposition of Operable Unit 4 debris and contaminated soil respectively.

(t) Comment: "Has an exemption to the Ohio solid waste facility requirement been requested, and if not when will such a request be made? Also line 28, page 79, would read better if "the" or "a" were added to precede disposal. (For disposal facility on the FEMP site.)

Response: Operable Unit 4 will not be creating a new solid waste disposal unit for management of Operable Unit 4 remediation waste as part of the Operable Unit 4 preferred remedy. Rather, the decision to treat/dispose of Operable Unit 4 wastes on site will be part of the Operable Units 3 and 5 RODs, since the disposition of Operable Unit 4 demolition debris and soils for remediation will be deferred to those respective operable units. Therefore, compliance with the Ohio siting requirement is not germane to the Operable Unit 4 FS/PP-DEIS.

Discussions with the EPA and OEPA have taken place regarding exemptions and possible waiver to this requirement. At this time, the issue of technical exemption under Ohio statute, versus ARAR waiver by EPA has not been resolved.

The editorial comment on the text contained in Line 28, Page 79, has been noted. However, it does not have any impact on the document.

The Ohio EPA (Commentor R) noted that DOE should attempt to incorporate pollution prevention activities whenever possible during the design and operation of the OU4 remedial action system. In addition, the Ohio EPA commented that all available methods to reduce or eliminate discharges from the treatment system should be considered during the design of the system. It is DOE policy, in accordance with Executive Order 12856, whenever feasible to apply pollution prevention and waste minimization principles into the design and operation of all its facilities. The DOE is committed to employing all available methods and techniques to minimize waste and/or eliminate discharges from remedial treatment systems in a manner protective of human health and the environment.

The Ohio EPA (Commentor P) stated that, . . . "The OU4 Proposed Plan is the culmination of efforts by U.S. DOE, Ohio EPA, and U.S. EPA to understand and develop a plan for mitigating releases to the environment from OU4. The alternative selected in the Proposed Plan will address potential and actual releases in a manner protective of human health and the environment." The DOE acknowledges the Ohio EPA comment and believes that the implementation of the preferred alternative identified in the Proposed Plan will address the remediation of the Operable Unit 4 area in a manner protective of human health and the environment.

The US EPA, Planning and Management Division (Commentor S) stated that, ... "the only comments on the record from our agency are those previously supplied to you by our Waste Management Division. At this point in time, given the requirements of NEPA and its implementing regulations, those comments will have to suffice as our agency's comments. Provided that the comments previously provided by our Waste Management Division are complied with, and further provided that facility in question is subsequently operated in full accordance with applicable local, State, and Federal requirements, it appears unlikely at this tune that any significant adverse impacts on the environment can reasonably be foreseen." The DOE previously addressed the US EPA Region 5, Waste Management comments on the Operable Unit 4 FS/PP-DEIS in May 1994. These comments were satisfactorily resolved with the US EPA Waste Management Division at that time. Section 11 of this responsiveness summary details the significant changes required by the resolution of the US EPA Waste Management Division comments.

ATTACHMENT C.I

WRITTEN AND ORAL COMMENTS

TABLE OF CONTENTS

LIST OF TABLES

C.I WRITTEN AND ORAL COMMENTS

C.I.1 INTRODUCTION

The written comments received on the Operable Unit 4 FS/PP-DEIS during the March 7, 1994 - June 19, 1994 comment period and the verbal comments received during the March 21, 1994 public meeting at The Plantation in Harrison, Ohio are contained in this appendix. In addition, all late comments received as of July 5, 1994 are included in this appendix. Each specific comment letter, oral statement, and submitted attachments are referenced by an alphabetic identifier as noted in Table C.I.1-1. These comments are a formal part of the Administrative Record for this action.

TABLE C.I.1-1
FORMAL ORAL AND WRITTEN COMMENTS RECEIVED

ITEM	COMMENTOR	PAGE NUMBER
FORMAL ORAL COMMENTS		
A	Norma Nungester, resident and FRESH member	C-I-8
B	Vicky Dastillung, resident and FRESH Vice President	C-I-19
C	Lou Bogar, resident, Hamilton, Ohio	C-I-20
D	Edwa Yocum, resident and FRESH Secretary	C-I-28
FORMAL WRITTEN COMMENTS		
E	Maud Naroll, State of Nevada, State Clearinghouse (April 18, 1994)	C-I-31
F	Jack and Roberta Warndorf, resident, Okeana, Ohio	C-I-34
G	Edwa Yocum, resident and FRESH Secretary, Harrison, Ohio	C-I-35
H	J. E. Walther, resident, Hamilton, Ohio	C-I-36
I	Martha J. Raymond, Department Head, Technical Review Services, Ohio Historic Preservation Office	C-I-38
J	Lisa Crawford, resident and FRESH President	C-I-40
K	Lawrence L. Stebbins, resident, Hamilton, Ohio	C-I-41
L	Maud Naroll, State of Nevada, State Clearinghouse (April 5, 1994)	C-I-43
M	James K. O'Steen, Director, Office of Hazardous Materials Technology, U.S. Department of Transportation	C-I-45
N	William L. Vasconi, Acting Chairman, Nevada Test Site Citizens Advisory Board	C-I-47
O	Nevada Test Site Citizens Advisory Board	C-I-48
P-1	Nichole Davis, 1600 E. University #151, Las Vegas, NV 89119	C-I-49
P-2	Shellie Michael, 2800 S. Eastern #717, Las Vegas, NV 89109	C-I-49

ITEM	COMMENTOR	PAGE NUMBER
P-3	Lynn Rohl, P.O. Box 12303, Las Vegas, NV 89112	C-I-50
P-4	Ted Mucha, 301 Orland #8, Las Vegas, NV 89107	C-I-50
P-5	Mark Michael, 2800 S. Eastern #717, Las Vegas, NV 89109	C-I-51
P-6	Kathleen Guise, 4124 Seville St., Las Vegas, NV 89121	C-I-51
P-7	Jo Anne Moran, 3128 E. Flamingo #203, Las Vegas, NV 89121	C-I-52
P-8	Catherine A. McLaughlin, 1721 Howard Ave., Las Vegas, NV 89104	C-I-52
P-9	Nancy Gott, 3212 Brahns Dr., Las Vegas, NV 89102	C-I-53
P-10	Rebecca Webber, 5070 River Glen Dr. #457, Las Vegas, NV 89103	C-I-53
P-11	Tanya Carr, 2032 Shadow Brook Way, Las Vegas, NV 89014	C-I-54
P-12	Jim Macklin, 5178 Silverheart Ave., Las Vegas, NV (no zipcode provided)	C-I-54
P-13	Cindy Weatherby, 1760 N. Decatur #69, Las Vegas, NV 89108	C-I-55
P-14	Rebecca Heider, 6941 W. Forest Vista St., Las Vegas, NV 89117	C-I-55
P-15	Troy Weatherby, 1760 N. Decatur #69, Las Vegas, NV 89108	C-I-56
P-16	Abraham Hartman, 1872 Pasadena Blvd., Las Vegas, NV 89115	C-I-56
P-17	Vicki Cassman, P.O. Box 72634, Las Vegas, NV 89170	C-I-57
P-18	Art Goldberg, 14810 Living Desert Dr., Las Vegas, NV 89119	C-I-57
P-19	Jillian Beth Wright, 6435 Iorn Bark Lane (address provided incomplete)	C-I-58
P-20	Linda Strange, 4830 Nara Vista Way #102, Las Vegas, NV 89103	C-I-58
P-21	Ronnie Strange, 4830 Nara Vista Way #102, Las Vegas, NV 89103	C-I-59
P-22	Mindy Brummett, 6397 Spring Meadow Dr., Las Vegas, NV 89103	C-I-59
P-23	LaLori Rossi, 1929 Franklin Ave. (address provided incomplete)	C-I-60

P-24	Taryn Cunningham, 7383 Newerest Cir., Las Vegas, NV 89117	C-I-60
P-25	Tiffany Brummett, 6397 Spring Meadow Dr., Las Vegas, NV 89103	C-I-61
P-26	Janet Zimmerman, 1912 Spangle Dr., Las Vegas, NV 89108	C-I-61
P-27	Janene Zimmerman, 1912 Spangle Dr., Las Vegas, NV 89108	C-I-62
P-28	Patricia Bishop, 1400 S. Casino Ct. #19, Las Vegas, NV 89104	C-I-62
P-29	Daniel J. Fedor, 185 Sweab, Las Vegas, NV 89115	C-I-63
P-30	Michael Carrigan, 7217 Tempest Pl., Las Vegas, NV 89128	C-I-63
P-31	Renee Halm, 1000 King Richard, Las Vegas, NV 89119	C-1-64
P-32	Tubiola Lopez, 1508 Living Desert Dr., La Vegas, NV 89119	C-I-64
P-33	Doreina Saenz, 2111 Fairfield #6, Las Vegas, NV 89102	C-I-65
P-34	Jerome Brenberg, 5668 Divot Pl., Las Vegas, NV 89130	C-I-65
P-35	Ravon Rodriguez, 538 Kolson Cr. #"A" (address provided incomplete)	C-I-66

ITEM	COMMENTOR	PAGE NUMBER
P-36	Carmen E. Rodriguez, 538 Kolson Cr. #"A" (address provided incomplete)	C-I-66
P-37	Kimba Rutledge, 399 Steelhead Lane, Las Vegas, NV 89110	C-I-67
P-38	Sheila Rutledge, 399 Steelhead Ln., Las Vegas, NV 89110	C-I-67
P-39	S. Humhe, 9285 Sunten Ct., Las Vegas, NV (address provided incomplete)	C-I-68
P-40	Michelle Lynn Berry, 370 E. Harmon Apt. E310, Las Vegas, NV 89109	C-I-68
P-41	L. Jean McCoy, 6710 Wild Horse Rd., Las Vegas, NV 89108	C-I-69
P-42	Tammy Smith, 6710 Wild Horse Rd., Las Vegas, NV 89108	C-I-69
P-43	Hermy B. (?), 1982 N. Rainbow #194, Las Vegas, NV 89108 (name unreadable)	C-I-70
P-44	Stan Greene, 7845 La Cienega, Las Vegas, NV 89123	C-I-70
P-45	Frances Bruno, 486 Sierra Vista Dr. #24 (address provided incomplete)	C-I-71
P-46	Betty Hay, 1241 South 7th St., Las Vegas, NV 89104	C-I-71
P-47	David Geerts, 3940 S. Algonquin Dr. #83, Las Vegas, NV 89119	C-I-72
P-48	John Engle, 4441 Escondido St. Apt. #4205 (address provided incomplete)	C-I-72
P-49	Alison Orr, 7053 Cheerful Circle, Las Vegas, NV 89117	C-I-73
P-50	David Gohas, P.O. 46204, Las Vegas, NV 89114	C-I-73
P-51	Finu Norris-Coray, 4801 Spencer #56, Las Vegas, NV 89119	C-I-74
P-52	Elizabeth Petit, 2362 N. Green Valley Parkway #141P, Henderson, NV 89014	C-I-74
P-53	Sonja Swenson, 4444 Midway Lane, Las Vegas, NV 89108	C-I-75
P-54	Ron Schaefer, 3950 Mountain Vista #146, Las Vegas, NV 89121	C-I-75
P-55	Victoria Pinkston, 1771 Charnut Lane (address provided incomplete)	C-I-76
P-56	Kathy Granousky, 3355 Dakota Way, Las Vegas, NV 89109	C-I-76
P-57	Emilee Rogers, 1105 Washington (address provided incomplete)	C-I-77
P-58	Michael LoCorriere, 7201 W. Girard Drive, Las Vegas, NV 89117	C-I-77
P-59	Sheri LoCorriere, 7201 W. Girard Drive, Las Vegas, NV 89117	C-I-78
P-60	Breck Nester, 24252 Sparrow, El Toro, CA 92630	C-I-78
P-61	Dana Robbins, 5028 S. Rainbow #101, Las Vegas, NV 89118	C-I-79
P-62	Huy Phan, 3719 Central Park Circle, #4 (address provided incomplete)	C-I-79
P-63	Sandra Travez, 30 Tierra Buena Drive, Las Vegas, NV 89110	C-I-80
P-64	Steve Zahn, 8305 Greshen, Las Vegas, NV (no zipcode provided)	C-I-80
P-65	Lisa Nunaq, 1009 Spire CNYN, Las Vegas, NV 89128	C-I-81
P-66	Tim Jaqua, 3273 E. Flamingo #102, Las Vegas, NV 89121	C-I-81

ITEM	COMMENTOR	PAGE NUMBER
P-67	Shelli McKenney, 4640 Victoria Beach Way, Las Vegas, NV (no zipcode provided)	C-I-82
P-68	Carmen Davis, 6666 W. Washington #463, Las Vegas, NV 89107	C-I-82
P-69	Nasreen Bakhtary, 2165 E. Rochelle #71, Las Vegas, NV 89119	C-I-83
P-70	Maribel McAdory, 2529 Pacific Avenue, Las Vegas, NV (no zipcode provided)	C-I-83

P-120	Sanena Shelling, 1445 E. Rochelle (address provided incomplete)	C-I-108
P-121	Gerald F. Cuetiovic, 135 Grandview Drive, Henderson, NV 89015	C-I-109
P-122	Judy Cuetkovic, 135 Grandview Drive, Henderson, NV 89015	C-I-109
P-123	Michael Cuetkovic, 135 Grandview Drive, Henderson, NV 89015	C-I-110
P-124	Mrs. G. Michakel, 4079 El Segundo Avenue, Las Vegas, NV 89121-1703	C-I-110
P-125	Willene De Langis, 758 Willow Avenue, Henderson, NV 89015	C-I-111
P-126	Donald A. De Langis, 758 Willow Avenue, Henderson, NV 89015	C-I-111
P-127	Robert Tonelli, 1004 University Ridge, Reno, NV (no zipcode provided)	C-I-112

ITEM	COMMENTOR	PAGE NUMBER
P-128	Ruth Lindahl, 9457 S. Las Vegas Blvd. S. #93, Las Vegas, NV 89123	C-I-112
P-129	Melody Derrick, 330 S. 10th St., Las Vegas, NV 89107	C-I-113
P-130	Doug Jablin, 3559 Markan St., Las Vegas, NV 89121	C-I-113
P-131	Anthony Bondi, 135 Albert Avenue St. E. #16, Las Vegas, NV (no zipcode provided)	C-I-114
P-132	T. Jones, Box 73215, Las Vegas, NV 89170	C-I-114
P-133	John A. Loeffler, P.O. Box 832, Searchlight, NV 89046	C-I-115
P-134	Christopher Mercer, 2517 Huber Hts., Las Vegas, NV 89128	C-I-115
P-135	Kurt Buchida, 325 Maryland Parkway, Las Vegas, NV 89101	C-I-116
P-136	Liz Marion, 6824 Adobe Court, Las Vegas, NV 89102	C-I-116
P-137	Dennis A. Dewitt, Box 5371, Reno, NV 89513	C-I-117
P-138	Brenda Weksler, 7904 Marbella Circle, Las Vegas, NV 89128	C-I-117
P-139	Cheryl Frossa, 3450 Erva St. #101, Las Vegas, NV 89117	C-I-118
P-140	Harriet R. Gagliano, 2713 Gilmary Avenue, Las Vegas, NV 89102	C-I-118
P-141	Kathy Poma, 2113 Fountain Springs Drive, Henderson, NV 89014	C-I-119
P-142	Stacey Hallenberg, 2245 Maple Rose Drive, Las Vegas, NV 89134	C-I-119
P-143	Kelli Koerwitz, 909 Willowtree, Las Vegas, NV 89128	C-I-120
P-144	Trish Taylor, 2113 Fountain Springs Drive, Henderson, NV 89014	C-1-120
P-145	Heather Davis, 2031 E. Windmill Lane, Las Vegas, NV 89123	C-I-121
P-146	Marilyn Benoit, 3461 Pointe Willow, Las Vegas, NV 89120	C-I-121
P-147	Richard Lewnau, 2950 S. Decatur D-3, Las Vegas, NV 89102	C-I-122
P-148	Susan Thornton, 1412 Golden Spur Lane, Las Vegas, NV 89117	C-I-122
P-149	Lee Dazey, 72 Keystone Avenue, Reno, NV 89503	C-I-123
P-150	Pete Mastin, P.O. Box 92, Verdi, NV 89439	C-I-123
P-151	Tracie K. Lindeman, P.O. Box 1672, Fallon, NV 89407	C-I-124
P-152	David L. Platerio/Tosa-wi-e, P.O. Box 822, Elko, NV	C-I-124
P-153	Jo Ana Garrett, P.O. Box 130, Baker, NV 89311	C-I-125
P-154	Margaret Norman, 2332 Grant Street, Berkeley, CA 94703	C-I-125
P-155	Judy Treichel, 3926 Bushnell Drive #71, Las Vegas, NV 89103	C-I-126
P-156	Lorry C. Johns, 2090 Westwind Road, Las Vegas, NV 89102	C-I-126
P-157	Steve Frishman, 208 N. Hwy. 95A, Yerington, NV 89447	C-I-127
P-158	William Rosse Sr., HC61 Box 6240, Austin, NV 89310-9301	C-I-127

ITEM	COMMENTOR	PAGE NUMBER
P-159	Corbin Hanuf (?), P.O. Box 1255, Nevada City, CA 95959 (name was hard to read)	C-I-128
P-160	Shawn Black, 650 Whitney Ranch #1423, Las Vegas, NV (no zipcode provided)	C-I-128
P-161	Lawrence Skinner, 1604 E. Evans, Las Vegas, NV 89030	C-I-129
P-162	Mary L. Johns, 2090 Westwind Road, Las Vegas, NV 89102	C-I-129
P-163	Bob Fulkerson, 725 McDonald Drive, Reno, NV 89503	C-I-130
P-164	Carla Baker Wallace, 3245 Mallard, Las Vegas, NV 89107	C-I-130
P-165	Louise (?), 4255 Tamarus #217, Las Vegas, NV 89119 (name was hard to	C-I-131

read)

P-166	Margaret (?), 1526 Darryl Avenue, Las Vegas, NV 89123	C-I-131
P-167	(?), 1526 Darryl Avenue, Las Vegas, NV 89123 (name unreadable)	C-I-132
P-168	(?), 1381 E. University Avenue (address incomplete and name unreadable)	C-I-132
P-169	(?), 4801 Spencer #56, Las Vegas, NV 89119 (name unreadable)	C-I-133
P-170	(?), 1431 E. Charleston, Las Vegas, NV 89104 (name unreadable)	C-I-133
P-171	Jamie B. (?), 4630 White Rock Drive, Las Vegas, NV 89121 (name unreadable)	C-I-134
P-172	(name and address unreadable)	C-I-134
P-173	(name and address unreadable)	C-I-135
P-174	(left blank)	C-I-135
P-175a	Geoff Holton, 2332 Grant Street, Berkeley, CA 94703	C-I-136
P-176a	Richard Glasman, 2212 18th Avenue South, Seattle, WA 98144	C-I-136
P-177a	Kathleen Glasman, 2212 18th Avenue South, Seattle, WA 98144	C-I-137
Q	Pam Dunn, Harrison, OH	C-I-138
R	Thomas A. Schneider, Ohio Environmental Protection Agency	C-I-145
S	Michael W. MacMullen, U.S. EPA Region 5, Planning and Management Division	C-I-147

a Postcards were received by the DOE on July 5, 1994.

few more of us from Ohio EPA. We're hiring some more staff, so hopefully that will be a little more proactive to your needs and help you out as far as information you night need. So like I said, feel free to contact me outside of this at the office or wherever. Thanks.

MR. STEGNER: Thank you. What we'll do now is, we'll have an informal question and answer session. It might be best if you use a microphone back there. If you don't feel comfortable, just stand up and shout it. We have a recorder here tonight. Please just state your name and the question, and we'll let the panel pick it up. So whoever wants to be first, feel free.

MS. NUNGSTER: I'm Norma Nungester. I'm a Fernald resident, and a member of Fresh. I have a question of Dennis Nixon. He made the statement that I don't agree with, and I wondered if he could clarify for me. He said that when you vitrify waste, it reduces radon emanation to that of building materials. To my understanding, when you vitrify radionuclides, that they still are very, very hot.

MR. NIXON: That's correct. The

concentrate, due that reduction, is the radon generation from the treated waste itself that is significantly reduce. The radon is actually held up, and the surface area is significantly reduced. Did you get every other word?

You're exactly right, that due to that fact that there's a significant volume reduction, you actually concentrate the radionuclides, so you have a higher concentration of say uranium in a set volume, but the radon itself is such less. The generation or the emanation from the vitrified waste is such less than in its natural form.

MS. NUNGESTER: Okay, thank you.

MS. YOCUM: Edwa Yocum, Fresh member and a resident of the Fernald area. I was asking a question, this concerns Subunit C2 on your preferred alternative demolition removal on property disposal. When you were talking about the OU4 NEPA compliance with the substantive cumulative impact up to 250 acres of surface disturbance, does that mean that would be what would be part of where the waste will be put?

MS. WOODS: Yeah. Again, we looked

at an LRA and assumed on-site disposal.

MS. YOCUM: Okay.

MR. WOODS: And that acreage would incur areas where waste would be disposed of.

MS. YOCUM: Okay. Then, you also are talking about the loss of 220 acres of habitat. Is that included in the 250 acres?

MR. WOODS: Yeah. That 250 would be a total that would occur during the short term, in other words, during excavation activities. Once remediation is completed, we would look at approximately 220 acres being permanently committed, so yes, that' a correct.

MS. YOCUM: Okay, all right, that's what I wanted to know.

MS. NUNGESTER: Can you expand on that permanently committed? I missed something. Permanently committed for what, waste disposal facility?

MR. WOODS: Yeah, correct.

MS. NUNGESTER: Not for the waste itself but for the --

MR. WOODS: For the facilities that would house the waste.

MS. NUNGESTER: That's the inground facility, the upgrade vault, as you so say?

MR. WOODS: Correct

MS. NUNGESTER: Now can you give me an explanation of what is in an upgrade vault?

MR. WOODS: The alternatives that we used for the evaluation utilized the vault concept, which would be a portion of the waste being disposed of below grade, and, you know, basically a portion above. There would be facilities that the waste could be retrieved from, and what we used was the calculation of the area.

MS. NUNGESTER: Disposal means permanent?

MR. WOODS: Yes.

MS. NUNGESTER: But now you're talking interim?

MR. WOODS: Well, what I'm saying is the design of the facility wasn't as important as the area that the facility could include. Designs are going to be finalized as we go through the remedial process.

MS. NUNGESTER: Well, this is another thing, when you go through the RA and that's where the final decision and designs are actually made --

MR. WOODS: Correct.

MS. NUNGESTER: -- how can you come out with a Record of Decision before you actually know what the vault is going to look like and if it is really going to do the job?

MR. WOODS: No, you cannot reach a Record of Decision until, you know, we've gone through the full analysis of what the vault will be designed like and how it will work. What we did is utilize the alternatives that were avallabla at that time for the purpose of the evaluation, which is really the best we can do. We can't foresee.

MS. NUNGESTER: Okay. As of today?

MR. WOODS: That's correct, that's correct. As we go through the various operable units and decisions are made as to the final design of the vaults and changes are made to the area, that may be required. We'll update the analysis and provide it in the future integrated documents for the other operable units.

MS. NUNGESTER: Okay. So than our decisions of the -- So your alternative for the

Unit 4 can change by the time after arriving at a decision?

MR. NIXON: We were specific with the subunit wastes the Record of Decision. For Operable Unit 4, specifically the Record of Decision, the proposed plan in the future Record of Decision will be that the Subunit C waste is -- you remember us talking about being held in abeyance or delayed operable units, the Subunit C waste will be handled in accordance with the Records of Decisions for Operable Unit 3 and Operable Unit 5, respectively. Okay.

So as far as our Record of Decision, essentially we carry it through the removal of the soil, interim storage of that soil in accordance with Removal Action 17, which is the management of those soils, demolition of the structures and storage of that debris in interim until OU3 comes up with a final decision for the debris.

OU5 will have a final decision on how the soils will be treated, and those all integrate very well. When we start that remediation process, when we have those soils excavated and stored, at that time Oparable Unit 3 and 5 Records of

Decisions will be in place, and we'll have very good integration.

At that point we'll be able to deliver -- Theoretically, we'll be able to take the soils out and take those to a Operable Unit 5 facility for treatment. They'll be disposed of in accordance with their Record of Decision, and that may or may not be on-site disposal.

MS. NUNGESTER: Okay. You're saying, you're taking the debris, the structure, the equipment, the surface soil, you're putting them all in the underground vaults?

MR. NIXON: Oparable Unit 4 is delaying that decision. That's going to be actually be stored in an interim fashion --

MS. NUNGESTER: Okay

MR. NIXON: -- until OU5 and OU3 have records of decision. Now, their Record of Decision may very well be that we will treat soil by washing it and disposing of that on site.

MS. NUNGESTER: Right, but it doesn't say that, that it's going to be interim until Unit 5 is considered.

MR. NIXON: The proposed plan does

clearly state, as well as the Record of Decision
will clearly state those, that integration.

MS. NUNGESTER: It does?

MR. NIXON: Yes, it does.

MS. NUNGESTER: Okay. Well, I know
on the proposed plan booklet on page 43 talks about
that specific issue.

MR. NIXON: Right.

MS. NUNGESTER: If anybody has that
book, and they want to look at it, they can, but I
don't believe it says -- It says something about
that it will be combined with 5, Unit 5, but it
does not say that would be interim disposal until
5.

MR. NIXON: Disposal, it is interim
storage.

MS. NUNGESTER: Or storage, but they
use "disposal" as the word throughout the whole --

MR. NIXON: In the proposed plan,
the proposed plan has, for Subunit C waste, it has
a selected or preferred alternative which is
on-site disposal identified and the reason that's
in there is because on-site and off-site disposal
was so close we had to select the one for the sake

evaluating the full alternative from start to finish. Okay.

Later in the document it talks about the integration effort that will occur with OU3 and OU5, and puts -- holds that decision in abeyance for final disposal of those debris and soil until OU3 and OU5 have their Records of Decision.

MR. ALLEN: The confusion could be the fact sheet on page 12 states that the soil debris will be disposed of on site.

MR. NIXON: There is an error in the fact sheet on page 12, the last paragraph I believe.

MS. NUNGESTER: Then, this shows more of a reason why the public should have a comment period before -- after -- in between the ROD's and even during the remedial, the RA, then, to underatand it. Thank you.

MR. STEGNER: Other questions?

UNIDENTIFIED SPEAKER: I have one, and it goes to back to when you were talking about, Randi about, the community and stake holders or public or whatever we're called these days, plays a part in this process. I'll echo what Edwa just

MR. STEGNER: Is Lee Bolver still here?

UNIDENTIFIED SPEAKER: He left.

MR. STEGNER: Bob, do you have something to say?

UNIDENTIFIED SPEAKER: I'll turn it in later.

MR. STEGNER: Bob Gessel -- Godsel, I`m sorry? Going very well so far. Tom Wagner, Citizens Task Force? Okay. We have an open mike, folks, if anyone wants to make a comment.

MS. NUNGESTER: You want my address, too?

MR. STEGNER: Not necesaary, as long as we have your name.

MS. NUNGESTER: Norma Nungester, Fernald resident and Fresh group. I have several comments. First of all, I want to cover again what was stated in the question and answer period. I think between the draft ROD and the final ROD we need a public comment official time, and you need to formalize this. On down here below you say the public involvement, public involvement, that means nothing to us. You need to formalize that.

And you also need more details on your RD/RA work plan. We want to know more details on transportation. We want to be notified when you're transporting this stuff and talk about the materials that are actually in the K-65 when they're vitrified and when you start to ship them out to Nevada.

Also this stuff that stays on site, I'd like to know how they will be monitored, and for how long of a period they're going to be monitored. I guess I just want to express that we want a guarantee that real-time monitoring will be used.

Also a suggestion, how about covering those silos when you start working on them? I think this is one of the most important things you could do for the community. I think that's about it. I'm trying to read my notes that are chicken scratch here.

Oh, one more thing. I'd like to be diligent on referring large quantities of waste from other sites. We don't want anything brought in here from other plants to vitrify with our material or to be put under the storage areas.

Commentor B

Vicky Dastillung: (Formal oral, documented by Johnny Reising, DOE, March 4, 1994)

What capabilities do we have to do "real-time monitoring?"

Who has the authority to "shut down" the operation if the "monitoring" levels are high?

FRESH wants more public input on the RD/RA process (real "nitty gritty" of how things will be done).

How has NEPA been addressed? Where and how do we bring this out in the document (Proposed Plan)?

Vicky does not believe the last bullet on page 12 of the Proposed Plan fact sheet is correct. (Her point is that we cannot pre-suppose that on-property disposal will be the result; it must be evaluated with Operable Units 3 and 5.)

unit, then.

UNIDENTIFIED SPEAKER: Okay. I'll discuss it with you.

UNIDENTIFIED SPEAKER: I'm Lou Bogart. I'm a resident of Ross. I have some technical questions. In looking at data tables for Operable Unit 4, one of the things that strikes me is that you always report uranium 254/236. Does that mean there's U-236 there? If so, I don't believe it because U-236 doesn't exist in nature.

Secondly, the ratio of U-234 to U-238 in many cases look very odd, odd in the sense that in nature and in this ore and in the raffinate the 234, 238 ratio ought to be very close to unit. For example, when in the table that you've given a handout, the Silo 1 number looks pretty wrong. The Silo 2 number is more acceptable.

And the reason I think that's important is because you're going to focus the clean-up levels on U-238. I don't quite know how you're going to do that without doing some very sophisticated isotopic analysis. But in any case those numbers don't look right, and you see that in many, many tables.

On the inorganic chemicals, is there somewhere in all the OU4 documentation a list of all of the inorganic constituents? For example, I note that in most of the recent documents you don't list gold. Now you can. There is about, about four times as much gold in this material as silver.

Just as a side light for my own amusement, I calculated this afternoon. There's about $2.3 million worth of gold in those two silos, and that may not be important, but what other elements are not reported which may have some impact on the processing of the material by vitritication?

For example, there should be a fair burden of rare earths, the whole lamprophyllite series should be in these ores, and I don't see any of that being reported. Anybody have an answer for that one?

MR. NIXON: Well, you had about five questions, so I'll start in the beginning. One was 235 to 236, those are analysed and reported the same. You are correct. We don't feel there is any uranium-236 in the residues. It's a good point.

Whether the ratio between U-234 and U-238 is correct, I do not have the answer to that, but we can discuss that and get back with you within the next couple of days.

MR. BOGART: How about a complete list of --

MR. NIXON: Complete list the remedial investigation did do a complete list of the organics, inorganics. Whether gold was evaluated, I'm not sure. I'm looking at my team.

MR. BOGART: You were supplied gold by TLCP.

MR. NIXON: But we also do a full HSL, Hazardous Substance List, which gold would not be part of. So I'n not sure whether gold was particularly reported in the RI.

MR. BOGART: How about rare earths?

MR. NIXON: I couldn't answer that, either. We've got a copy of the remedial investigation here. whether these fellows can quickly find answers to those questions or again we can get back with you.

Amy Engler I know is sitting out here somewhere taking very good notes, and we'll respond to any of the questions which we don't have answers to tonight. We've committed to have answers back within 48 hours from this evening.

MR. BOGART: Well, I -- not so much for myself, but I think for the general public.

MR. NIXON: Any question that is raised even in the informal conference will be addressed in the responsiveness.

UNIDENTIFIED SPEAKER: Can we use that gold as collateral, can we use that? You said there'a like $2 million worth of gold. Can we use that as collateral somehow?

MR. BOGART: It's going to cost 90 million bucks, maybe we can make it 88 million bucks. On page 21 or whatever this thing is called, the proposed plan, the spiral-bound thing, on page 12 about the middle of the page is an initiation of a discussion about risk.

And this is the area that conecrns me the greatest, because although you point out that -- And I presume in all cases you're talking about fatal cancers because there are, of course, nonfatal cancers also. And that's not terribly clear in anything that's written.

Risk from exposure, the radiation naturally occurring in the environment is about 1 in 100 primarily from radon; however, incremental risks targeted by the upper end of EPA range means if all persons within a population of 10,000, 1 person might get cancer from the exposure, and cancer is expected from all other causes. I think the whole business of risk assessment needs to be put into some kind of context.

If you look at the latest NCRP guidance, 115 and I guess 116, you can talk about risk in terms of about 4 or 5 times 10 to the minus 10 and you do the hocus-pocus chemists like to do. And that turns out the average resident from natural radon, that risk becomes about one half times 10 to the minus 2 and the range is 0 to 90 years old. And when 90 years old, I guess cancer is the last thing I'm going to worry about.

But in any event, you make the statement that the normal cancer risk is about 10 to the minus 2, and then you proceed to march down the road of things that are 2 to 4 to 5 orders of magnitude smaller, and it's never put in context. And I think these documents need to discuss what are we paying for, and that becomes a real problem. I don't know how many people feel comfortable with a 10 to the minus 6 risk, and I'm not real sure that that's a fatal cancer risk.

There is a problem with the methodology of using the health effect summary table slope factor thing as opposed to methodology that's used by people who do the beer studies and the NCRP studies because we're talking about vast orders of magnitude differences.

Now, the last comment I guess, I'd like to see something in these documents that more clearly explains why the CERCLA process has elected to use such abominably small risk estimates.

My last comment perhaps goes to EPA back in 1986, was a bad year for me, EPA published a notice of intent that they were going to promulgate residual regulation standards. It is now 1994, and, to the best of my knowledge, residual radiation level standards have not been promulgated.

In 1993 in a GAO report to Congress somebody in EPA said that in March of 1994 they were going to finally publish residual radiation standards, not publish them, but they would take them to OMB, which would be the fist step in getting them published -- well, not the first step, but a key step in getting them published in the Federal Register.

March 1994 is now. My concern is, is there one part of EPA working on residual radiation level standards which may very well impact on the clean-up levels that are being talked about here for the clean-up of OU4?

MR. NIXON: Was there any response?

MR. SARCA: Yeah, I can answer that from my understanding. One of the people involved from the EPA perspective that works with me, he's been commenting that he's involved in working on some of those standards. Will they directly impact this investigation, I don't know. I don't think so. Hearing some of the numbers, I think they may even be moving towards the side of being equally as conservative, could be more conservative.

I don't know what the final will come out with. When they do come out of the numbers, they'll go to budget and move forward from there. I do know that they are being worked on. One of the people from my office is doing that right now. I don't know the exact state.

UNIDENTIFIED SPEAKER: If memory serves, I think that the gold Lou was talking about was contained in the pitch blend or whatever it was that came over from Africa that the Unitad States bought and dumped into the X-65 silos. I heard or read that somewhere. You might want to check that out.

MR. NIXON: It is in the X-65 materiel, yes.

MR. BOGART: It all came from one mine.

UNIDENTIFED SPEAKER: The reason they took that pitch was they wanted to strike gold?

MR. BOGART: No, radium and gold.

UNIDENTIFIED SPEAKER: Aa far as I'm concerned, it can be vitrified.

MR. BOGART: The question was, what else is there?

UNIDENTIFIED SPEAKER: Okay. I just have another question. When you said they were filling the silos, especially 1 and 2, did they

Commentor D

Edwa Yocum: (Formal oral, March 21, 1994)

concentrate, due that reduction, is the radon generation from the treated waste itself that is significantly reduce. The radon is actually held up, and the surface area is significantly reduced. Did you get every other word?

You're exactly right, that due to that fact that there's a significant volume reduction, you actually concentrate the radionuclides , so you have a higher concentration of say uranium in a set volume, but the radon itself is much less. The generation or the emanation from the vitrified wast is such less than in its natural form.

MS. NUNGESER: Okay, thank you.

MS. YOCUM: Edwa Yocum, Fresh member and a resident of the Fernald area. I was asking a question, that concerns Subunit C2 on your preferred alternative demolition removal on property disposal. When you were talking about the OU4 NEPA compliance with the substantive cumulative impact up to 250 acres of surface disturbance, does that mean that would be what would be part of where the waste will be put?

MR. WOODS: Yeah. Again, we looked

at an LRA and assumed on-site disposal.

MS. YOCUM: Okay.

MR. WOODS: And that acreage would incur areas where waste would be disposed of.

MS. YOCUM: Okay. Then, you also are talking about the loss of 220 acres of habitat. Is that included in the 250 acres?

MR. WOODS: Yeah. That 250 would be a total that would occur during the short term, in other words, during excavation activities. Once remediation is completed, we would look at approximately 220 acres being permanently committed, so yes, that's correct.

MS. YOCUM: Okay, all right, that'a what I wanted to know.

MS. NUNGESTER: Can you expand on that permanently committed? I missed something. Permanently committed for what, waste disposal facility?

MR. WOODS: Yeah, correct.

MS. NUNGESTER: Not for the waste itself but for the --

MR. WOODS: For the facilities that would house the waste.

Thank you.

MR. STEGNER: Thank you, Norma. Edwa?

MS. YOCUM: Edwa Yocum. Some of this will sound repetitious, but I'm asking for a public comment period between the ROD's, the draft and final; and we need an official pubilc comment period after the RA process. And also I'm asking for a pubilc comment period between the beginning and completion of remediation. And then, too, when dismantling the K-65 silos and also the 3 and 4, I'd like to have a protective cover be used around tho silos.

And as far as I read in there, that EPA would be reviewing the vault or the disposal sites every five years, I`d like to know the definition of "reviewing," and I would like continuous monitoring and maintenance of on-site disposal vaults or at lesat one time a year as long as they're on site. And also, who would be paying for this monitoring and maintenance? And this way I recomment a trust fund for monitoring and maintenance of the disposals.

MR. STEGNER: Thank you, Edwa. Open

BOB MILLER STATE OF NEVADA JOHN P. COMEAUX
Governor Director

<IMG SRC 0595287I>
Commentor E

DEPARTMENT OF ADMINISTRATION
Capitol Complex
Carson city, Nevada 89710
FAX (702) 687-3982
(702) 687-4065

April 18, 1994

Mr. Ken Morgan
Public Information Director
ATTN: FS/PP-DEIS Comments
Fernald Field Office
U.S. Department of Energy
Post Office Box 398705
Cincinnati, Ohio 45239-8705

RE: Fernald Environmental Impact Statement, Operable Unit 4 Fernald, Ohio

Dear Mr. Morgan:

Thank you for providing the State of Nevada the opportunity to review the Department of Energy's Feasibility Study/Proposed Plan Draft Environmental Impact Statement (EIS) for Remedial Action at Operable Unit (OU) 4 of the Fernald Environmental Management Project (FEMP). As you know, the draft EIS assesses the potential environmental impacts of removing and treating silo materials and surrounding environmental media at DOE's Fernald plant in Ohio and sending these treated materials to the Nevada Test Site (NTS) for final disposal. Following are the state's comments on this proposal.

As we understand the proposed action, DOE is taking the position that the thorium mill tailing waste, which is admitted to be mixed waste, is not subject to Environmental Protection Agency (EPA) or State of Nevada regulatory control. For the reasons specified below, we believe this position is not correct.

Commentor E

- In 1987 DOE promulgated regulations (10 CFR 962.1) stating that RCRA hazardous waste, mixed with byproduct material falling under the category defined in the Atomic Energy Act (42 USC 2014(e)(1), would be subject to regulation (i.e. the hazardous components of the mixed waste) by EPA and EPA-delegated States. However, the byproduct material falling under the category given in 42 USC 2014(e)(2) that was mixed with RCRA hazardous waste, while constituting a mixed waste, would not be subject to regulations by EPA or EPA-delegated States. We note promulgation of these regulations and associated restrictions were carried out prior to the passage of the Federal Facility Compliance Act of 1992 (FFCAct).

- As you know, under the FFCAct, congress defined mixed waste to mean "waste that contains both hazardous waste and source, special nuclear, or by-product material subject to the Atomic Energy ACT of 1954." This definition shows no destinction between the two categories of byproduct material mentioned above. Hence, the attempted exemption from hazardous waste regulations of the hazardous components of mixed waste containing byproduct material from EPA/State regulatory control, has been invalidated.

- We also note that EPA has delegated to the states regulatory control over all mixed wastes without regard to specific radionuclide content, which is consistent with the expression of Congressional intent in defining mixed waste under the FFCAct (See 51 FR, July 3, 1986, 24504-24505).

Based on these points, it is the State of Nevada's position that the regulatory issues described in the above mentioned Draft EIS have not been adequately addressed.

We also note that the cost estimates of long-term storage/disposal of mixed waste at the NTS were not properly accounted for in the Draft EIS. The assumptions, for example, under which storage/disposal of mixed waste at the NTS could be considered "free" when compared to a commerical facility, were not presented in the document.

Commentor E

In a related matter, we are still waiting for a response concerning our request for an extension of the comment period for the subject Draft EIS. As you may recall, we recently requested the extension to facilitate stakeholder involvement activities in southern Nevada.

Thank you for the opportunity to comment on the above mentioned Draft EIS.

Sincerely,

Maud Naroll
State Clearinghouse

MN/jbw
cc: Governors Office
Affected State Agencies
Nevada Congressional Delagation
Carol M. Borgstrom DOEHQ/NEPA
Joseph Flore, DOE/NV
Donald R. Elle, DOE/NV

Commentor F

COMMENT SHEET

DOE is interested in your comments on the cleanup alternatives being considered in the Feasibility Study/Proposed Plan-Draft Environmental Impact Statement for Remedial Action at Operable Unit 4. Please use the space provided below to write your comments, then fold, staple or tape, and mail this form. We must receive your comments on or before the close of the public comment period on April 20, 1994. If you have questions about the comment period, please contact Ken Morgan, the DOE Public Information Officer at Fernald, at (513) 648-3131.

Due to its proximity to the Great Miami River, this land is part of the migratory flyway. Ducks, geese and other migratory birds fly over this area or use it as their residence many months of the year.

Presently, technology exists in landfill management using rubber (neoprene) liners to minimize water seepage. This technology could be incorporated into the Fernald area to create ponds and wetlands. Controlled water levels in ponds, reservoirs and wetlands could be regulated by the pumps and wells that are now in place and being used in the aquifer clean-up.

Hazardous waste should be taken out by rail since the tracks are in place. Handling this waste by transporting it by truck is much more dangerous.

I would discourage industrial development or development that would attract large concentrations of humans in case problems would happen to develop in the future. We cannot afford to have another Love Canal. Our area has had its fair share of negative press and peace of mind and good health is our wish for all.

Name:
<IMG SRC 0595287J>
Address:

City/State/Zip:

Phone:

MAILING LIST ADDITION:

Please add my name to the Fernald Mailing List to receive additional information on the cleanup progress at the Fernald Environmental Management Project:

YES____ NO____

Commentator G

COMMENT SHEET

DOE is interested in your comments on the cleanup alternatives being considered in the Feasibility Study/Proposed Plan-Draft Environmental Impact Statement for Remedial Action at Operable Unit 4. Please use the space provided below to write your comments, then fold, staple or tape, and mail this form. We must receive your comments on or before the close of the public comment period on April 20, 1994. If you have questions about the comment period, please contact Ken Morgan, the DOE Public Information Officer at Fernald, at (513) 648-3131.

<IMG SRC 0595287K>

Name:

Address:

City/State/Zip:

Phone:

MAILING LIST ADDITIONS:

Please add my name to the Fernald Mailing List to receive additional information on the cleanup progress at the Fernald Environmental Management Project:

YES____ NO____

3686 Cincinnati-Brookville Road
Hamilton, Ohio 45013
Commentor H
March 25, 1994

Mr. Ken Morgan
Director, Public Information
U.S. Department of Energy Field Office
P. O. Box 398705
Cincinnati, Ohio 45239-8705

SUBJECT: PUBLIC COMMENTS ON PROPOSED PLAN FOR REMEDIAL ACTION OPERABLE UNIT 4 FEMP SILOS 1,2 AND 3 CONCERNING PREVENTION OF OFFSITE MIGRATION OF AIR POLLUTION AND NOISE

Dear Mr. Morgan:

In order to prevent offsite contamination with respirable airborne cancer producing toxic gases, vapors, fumes and particulate matter from Remedial Actions at Operable Unit 4, it is suggested that at a minimum the following recommendations be adhered to regardless of which cleanup alternative is selected:

1. Construction of a fail safe containment facility maintained at negative air pressure (similar to a glove box) to house all vitrification, bulk reduction and/or cement stabilization equipment and associated HEPA filters, scrubbers, and gas treatment, etc. as well as all packaging operations.

2. Use of real time alarm system with backup must be used to detect failure of equipment including each and every filter and scrubber unit. Air returned to the environment must be cleaned.

3. Use of real time alarm system with backup to detect any toxic chemical contaminated air leaking into the total containment facility from malfunctioning equipment and packaging operations. Contaiminated air must be cleaned before being released into the environment. Dilution of highly toxic chemicals into the environment can not be tolerated as a solution.

4. All alarm systems must be checked and calibrated daily and back up alarm systems in place and operative at all times. Preventive maintenance of all equipment must be done at required scheduled intervals and checked by management.

5. To properly oversee the vitrification, bulk reduction, cement stabilization and packaging remediation operations, a member of management from Fluor Daniel, D.O.E. and US EPA must all be present at all times to quickly resolve any problems that are certain to come up, and to make certain that established safety procedures are followed to the letter.

6. Should contaminated air be detected entering the environment from whatever source, a complete shut down of the offending operation would be in order until corrected and Fernald neighbors be immediately notified through site perimeter public address speakers and news media.

Commentor H

7. Toxic chemicals or mixed toxic waste by any other name must not be brought into the Fernald Site to further contaminate it from anywhere else for any purpose whatsoever be it for testing, pilot runs, temporary or permanent storage, decontamination vitrification, bulk reduction or cement stabilization, etc.

8. State-of-the-art engineering noise controls should be incorporated in the design of facilities and equipment used so that no noise from remedial actions is heard downwind offsite. Noise resulting from the release of high pressure air or steam into the atmosphere must be attenuated through appropriate engineering controls.

9. Shipment of toxic wastes should be made to Nevada Test Site as soon as possible. Temporary storage of safely encapsulated toxic waste, contaminated soil and debris should be south of the production area as far from the heavily traveled Route 126 (Cincinnati-Brookville Road) as is feasible.

Please include the above as part of the formal Public Comment for Remediation of Operable Unit 4 FEMP Silos 1, 2 and 3.

Thank you for your help.

Sincerely,

J. E. Walther

Ohio Historic Preservation Office

Ohio Historacal Center
1982 Velma Avenue
Columbus, Ohio 43211-2497
614/297-2470
Fax: 297-2546

Commentor I

OHIO
HISTORICAL
SOCIETY
SINCE 1885

March 24, 1994

Mr. Ken Morgan
Public Information Director
ATTN: ES/PP-DEIS Comments
Fernald Field Office
U.S. Department of Energy
Post Office Box 398705
Cincinnati, OH 45239-8705

Re: Fernald Environmental Management Plan Butler and Hamilton Counties, Ohio

Dear Mr. Morgan

This is in response to correspondence from Carol M. Borgstrom of the Department of Energy dated February 24, 1994 (received March 1) regarding the above referenced project (a copy of the correspondence was also submitted through the State Clearinghouse and received March 7, 1994). The comments of the Ohio Historic Preservation Office (OHPO) are submitted in accordance with provisions of the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 [36 CFR 800]); the U.S. Department of Energy serves as the lead federal agency. My staff has reviewed this project and I offer the following comments.

OHPO has two areas of concern for the proposed clean-up at the Fernald facility. This particular part of the clean up involves proposed demolition of storage silos in Operable Unit 4. Additional actions are under consideration for several other operable units in the waste storage area. The first area of concern is the potential for impacts to archaeological sites. The Fernald facility is located in an archaeologically sensitive area and several archaeological studies have been completed for other actions related to the clean-up in and around the Fernald facility. Until a programmatic agreement has been developed, each project will require coordination with this office for archaeological resources. Coordination is anticipated regarding the proposed demolition of the silos providing us sufficient information to make a recommendation for archaeological investigations. At this time we have not determined that any archaeological work is needed for any of the proposed or future actions in the waste storage area. The coordination should provide detailed mapping, descriptions of the soils (to determine if any areas within the project area are relatively undisturbed), descriptions of the proposed actions including ancillary work areas and any temporary storage areas, and photographs of the facilities.

The second area of concern relates to the Fernald facility as an integrated series of architectural sturctures and facilities. It is our position under guidelines provided by the Advisory Council on Historic Preservation, the National Council of State Historic Preservation Officers, and the Department of Defense, that the Fernald Facility is eligible for inclusion in the National Register of Historic Places. It is our position that the facility includes all of the structures and facilities within the 1000 plus acre tract. The Fernald facility is eligible because of the important role it played in support of United States defense programs during the Cold War, thus, the facility is a significant part of one of the most important aspects of our history.

The proposed demolition of the silos, or any other structure or facility, could have an adverse effect on the Fernald facility. Coordination with this office is required prior to the implementation of any plan or action resulting in demolition or changes to any structure or facility. OHPO recommends the development of a programmatic agreement to address historic preservation concerns. Once we have established the context for the Fernald facility and the limits of the contributing structures and facilities, then specific recommendations can be made regarding proposed actions such as the proposed demolition of the silos. In the interim, it is our recommendation that the silos should be regarded as contributing structures and we should proceed under the assumption that the proposed demolition will have an adverse effect on a district eligible for inclusion in the National Register of Historic Places. Coordination with this office is recommended to begin preparing the necessary documentation for this action.

In summary, OHPO recommends changes to the Draft Environmental Impact Statement to include coordination with this office under provisions of the National Historic Preservation Act.

Any questions concerning this matter should be addressed to David Snyder or Julie Quinlan at (614)297-2470, between the hours of 8 am to 5 pm. Thank you for your cooperation.

Sincerely,

Martha J. Raymond, Department Head
Technical and Review Services

MJR/DMS:ds

xc: Carol M. Borgstrom, Department of Energy
State Clearinghouse (OH940225-X763-36.471)

Commentor J

April 17, 1994

TO: Ken Morgan, Public Relations, U.S. DOE, FEMP

FROM: Lisa Crawford, President. F.R.E.S.H., INC.

SUBJECT: O.U. 4 Comments on Proposed Plan

Listed below are my comments on the O.U. 4 Proposed Plan:

1.) DOE should include and or develop real-time monitoring for discharges to the environment resulting from remedial actions.

2.) Information obtained from real-time monitoring and any other monitoring activities should be provided to the public.

3.) DOE should incorporate pollution provention activities whenever possible during the design and operation of the OU 4 remedial action system.

4.) DOE must make certain that the public has involvement and it will continue during the RD/RA. DOE must commit to continued public involvement during this period.

5.) DOE must revise the site community ralations plan to meet the need for continued public involvement during the RD/RA.

6.) DOE must and will keep the public abreast of all decisions and any changes that occur during this period.

If you have questions, plesse feel free to contact me. Thank you.

LC:eac

cc: files

Commentor K

3944 Silax Dr.
Hamilton, OH 45013
April 20, 1994

Mr. K. L. Morgan
Public Information Officer
DOE Field Office, Fernald
U. S. Departmant of Energy
P. O. Box 398705
Cincinnati, Ohio 45239-8705

After reviewing the Proposed Plan for Remedial Actions at Operable Unit 4 at Fernald, I would like to voice to you some of my concerns as a resident who lives downwind of the proposed activity.

I would like to know if there have been any air pollution models run which show the distribution of the contamination that will be caused as a result of these activities. Not screening types models, but specifically comprehensive models which take into consideration terrain, windspeed, weather conditions, mixing height and the deposition patterns.

My major concern is the emission of radium (not radon) in the exhaust gases and fugitive gases from the proposed vitrification facility.

One of the important considerations for risk based calculations is that Elda Elementary School, the Ross Middle School, and the Ross Senior High School are all in the direction of the prevailing wind pattern. I would like to recommend that comprehensive air pollution modeling be done on the facility's impact to the area's air quality. I would like to see the vitrification unit's risk from fugitive and exhaust emissions quantified. I would like to see how the vitrification unit will impact the site's overall risk to the community. Lastly, I would like to see the impact that this will have on the site's radionuclide air emissions specifically with respect to radium emissions into the air.

I make these comments in good faith, and trust they will be received as a good faith effort to improve the implementation of the proposed action, and that no effort will be make by any party to affect my employment at the FEMP.

Respectfully yours,

Lawrence L. Stebbins

BOB MILLER   STATE OF NEVADA
Governor

<IMG SRC 0595287L>
 Commentor L
DEPARTMENT OF ADMINISTRATION
Capitol Complex
Carson city, Nevada 89710
FAX (702) 687-3982
(702) 687-4065

April 5, 1994

Mr. Ken Morgan
Public Information Director
ATTN: FS/PP-DEIS Comments
Fernald Field Office
U.S. Department of Energy
P.O. Box 398705
Cincinnati, Ohio 45239-8705

RE: Fernald Environmental Impact Statement, Operable Unit 4 Fernald, Ohio

Dear Mr. Morgan:

Thank you for providing the State of Neveda the opportunity to review the Department of Energy's Feasibility Study/Proposed Plan Draft Environmental Impact Statement (EIS) for Remedial Action at Operable Unit (OU) 4 of the Fernald Environmental Management Project (FEMP). As you know, this "Draft EIS" assesses alternatives for the removal, treatment, and disposal of radioactive material at DOE's Fernald site near Cincinnati, Ohio.

The proposed action analyzed in the Draft EIS is to assess the potential environmental impacts of DOE's preferred alternative, which is to remove silo material and surrounding environmental media, stabilize the product through vitrification, and sent the treated material to the Nevada Test Site (NTS) for final disposal. According to information provided to officials from DOE's Nevada Operations Office (DOE/NV), if the proposed action is implemented, over 300,000 cubic yards of radioactive waste would be disposed of at NTS. Disposal activities would cover a period of approximately thirty years.

Commentor L

As you know, comments on the Draft EIS are due on April 20, 1994. However, for the reason discussed below, we believe the comment due date should be extended to facilitate a more comprehensive stakeholder involvement process for the citizens of   Nevada.
Recently, a group of concerned Nevadans, affected Indian Tribes, and local government officials along with officials from the State and DOE jointly participated in the establishment of a Site Specific Advisory Board for DOE/NV's Environmental Restoration and Waste Management Program at the NTS. The group is officially titled The Citizens Advisory Board for NTS Programs (CAB). This new CAB for NTS programs held its first organizational meeting on March 8th, 1994.

Because the CAB will likely play a key role in advising DOE/NV about stakeholder concerns involving major program decisions such as those proposed in the above montioned document, we believe it is of paramount importance that the CAB be given the opportunity to discuss the possibility of requesting a briefing on the proposed action and alternatives discussed in the Draft EIS.

You might recall that such a briefing was provided by DOE officials and contractors from FEMP to officials from DOE/NV and the State of Nevada. Granting our request for an extended comments period of at least 60 days would allow the CAB to address this issue at its next meeting, which is scheduled for April 20, 1994.

We await your prompt decision concerning this request.

Sincerely,

Maud Naroll
State Clearinghouse

MN/jtw

cc: Members, Citizene Advisory Board NTS Programs
     Governors Office and Affected State Agencies

Nevada Congressional Delegation
Carol M. Borgstrom DOEHQ\NEPA
Nick C. Aquilina, DOE/NV
Joseph Flore, DOE/NV
Donald R. Elle, DOE/NV

Commentor M

<IMG SRC 0595287M>

U.S. Department of Transportation

Research and Special Programs Administration

Apr 21 1994

Mr. Ken Morgan
Public Information Director
ATTN: FS/PP-DEIS Comments
Fernald Field Office
U.S. Department of Energy
P.O. Box 398705
Cincinnati, OH 45239-0705

Dear Mr. Morgan:

This letter is in response to the February 24, 1994 letter from Ms. Carol M. Borgstrom, Director, Office of NEPA Oversight, Department of Energy to Ms. Kathleen C. DeMeter, Assistant Chief Council, National Highway Traffic Safety Administration, Department of Transportation (DOT). Ms. DeMeter forwarded that letter to the Research and Special Programs Administration (RSPA), the Federal agency primarily responsible for hazardous materials transportation regulations. That letter solicited review and comments on the Feasibility Study (FS), the Proposed Plan (PP), and the Draft Environmental Impact Statement (DEIS) documents for remediation of Operable Unit 4 of the Fernald Environmental Management Project (FEMP). Our review has focused on elements associated with the transportation of radioactive materials resulting from the remediation activities.

The reviewed documents are clearly of a general nature at this early phase of the program, and do not reflect all details such as radioassay methods, materials classification, and packaging required for compliance with the transportation regulations. There were no statements about any expected need for exemptions from the requirements of DOT regulations which are authorized under Title 49, Code of Federal Regulations (CFR), Part 107, rather, it is stated that all shipments will be made in full compliance with DOT regulations.

In the development of future documentation for the FEMP, it is suggested that technical attention be given to two minor concerns we saw in the FS/DEIS. First, in Volume One, Section 2.5.7.1, Page 2-78, it was stated that all materials transported would meet the definition of Low Specific Activity (LSA) radioactive materials as defined in 49 CFR 173.403(n). We believe the expected physical form of the material transported will result in the radiological risk to the public being equal to or less than most LSA shipments transported in the country. However, from Volume Two, Appendix A, Table A.1-1, it appears that the activity per gram of material for some of the package contents might exceed the limits for LSA materials in 49 CFR 173.403(n). The second concern is somewhat related to the activity per gram issue. In Volume One, Section 4.2.2, Page 4-25, it is noted that "sampling of the vitrified waste form would be limited to measurement of dose rate". After material vitrification, the external radiation dose rates will clearly be the indications of the most significant radiological hazards of the materials during transportation. However, since the identity of the radionuclides and the activity of the content in each package is required by the regulations, documentation with technical reasoning will be needed to relate the results of pre-vitrification radioassays to the contents of the packages.

From our limited review of the early phase planning documents, it appeared that there was not much information about non-radioactive hazardous materials transportation compliance issues, or about hazardous wastes subject to both DOT and Environmental Protection Agency regulations. Compliance with those regulations should not be difficult, the radiological hazards appear to be the greatest concern.

Except for the two minor concerns mentioned above, the reviewed documents appear to be satisfactory with respect to hazardous materials transportation.

Sincerely,

James K. O'Steen, Director
Office of Hazardous Materials Technology

cc: Carol M. Borgstrom

May 17, 1994

Mr. Ken Morgan
Director, Public Information
U.S. Department of Energy, Fernald Field Office P.O. Box 39705
Cincinnati, Ohio 45239-8705

SUBJECT: DOCUMENTS COMPRISING THE FINAL FEASIBILITY STUDY/PROPOSED PLAN - ENVIRONMENTAL IMPACT STATEMENT FOR REMEDIAL ACTIONS AT OPERABLE UNIT 4, THE FERNALD ENVIRONMENTAL PROJECT (DOE/EIS-0195d)

Dear Mr. Morgan:

The Nevada Test Site (NTS) Citizens Advisory Board (CAB) had the opportunity to meet with representatives of the Fernald Environmental Project at our May 11, 1994 meeting. The CAB is comprised of representatives from the public, citizens groups, Native Americans, local governments and others. Fernald staff provided a useful brief describing proposed shipments of radioactive material to the NTS. They and NTS Department of Energy (DOE) personnel at the meeting noted, however, that the deadline for comments to the EIS is May 20, 1994.

The May 11, 1994 meeting was the first time that the CAB had an opportunity to receive any information about the proposed shipments. The CAB has still not reviewed the documents. We would, therefore, have less than a week to review the EIS. The CAB is, therefore, requesting an extension of time to review the documents and provide substantive input to the process.

The shipments of radioactive waste from Fernald are the first of potentially many other shipments to the NTS. It is important, therefore, for the CAB to review the Fernald EIS proposal.

The CAB and citizens of Nevada trust that you will grant an extension of time for the review of the EIS documents.

Sincerely,

William L. Vasconi, Acting Chairman
Citizens Advisory Board
m583.vis

cc: James Sarit, Region V
Environmental Protection Agency

On June 24, 1994, the DOE received by facsimile transmission, the following four comments/issue statements on the behalf of the Nevada Test Site Citizens Advisory Board (CAB), from an individual who identified herself by telephone as Katherine Yuracko, a member of the CAB. As directed by Katherine Yuracko during the telephone conversation, the facsimile was redacted by DOE to only include verbatim the substantive comments/issue statements pertinent to the Operable Unit 4 FS/PP-DEIS.

<IMG SRC 0595287N>

Issues

1. The shipments of waste from Fernald are the first of potentially many other shipments to the NTS. Rather than making decisions on piecemeal basis, we went to see the full picture before we are asked to make decisions on individual pieces. That is, we want to first consider the total impact of all of the waste that is being considered for disposal at the NTS. Following that, we want to consider each individual piece.

2. The documents reviewed do not discuss the full range of possible alternatives. E.g.:

- disposal at Hanford
- reprocess to recover materials
- dispose of all material at the NTS

Why were these options rejected? What is the full list of options initially considered and why was each option rejected?

3. We believe that:

- funds should be provided for technical oversight of waste management activities
- the State of Nevada and affected Counties are entitled to impact mitigation payments as compensation for costs arising from management of this material

4. Based on the presence of RCRA regulated metals and organics in the waste, we are concerned that the waste contains both hazardous and radioactive constituents.

a. Please list the radionuclide and inorganic and organic chemical constituents of the waste.

b. Please identify the concentration of each constituent.

c. Please identify the risk resulting from each constituent

d. Please describe how the proposal treatment and disposal mechanisms address both the radionuclide and chemical constituents of the waste.

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

- The more than 300,000 cubic yards of radioactive waste consisting of uranium, thorium and radium among other radionuclides, should be kept on-site in containers adequate to protect the local populace. Nevadans should not be required to accept additional risk on top of that already present at the Nevada Test Site.
- Transportation risks need to be thoroughly evaluated.
- Socioeconomic impacts on the receptor community should be thoroughly evaluated and balanced against the desires of Ohio to move Fernald waste.

Name
<IMG SRC 05952870>
Address

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<IMG SRC 0595287P>
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Name
<IMG SRC 0595287Q>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287R>
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Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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<IMG SRC 0595287S>
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Name
<IMG SRC 0595287T>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287U>
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Name

<IMG SRC 0595287V>
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Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287W>
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Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287X>
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Name
<IMG SRC 0595287Y>
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<IMG SRC 0595287Z>
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<IMG SRC 0595287AB>
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Name
<IMG SRC 0595287AL>
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Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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<IMG SRC 0595287AM>
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<IMG SRC 0595287AP>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

! The more than 300,000 cubic yards of radioactive waste consisting of uranium, thorium and radium among other radionuclides, should be kept on-site in containers adequate to protect the local populace. Nevadans should not be required to accept additional risk on top of that already present at the Nevada Test Site.

! Transportation risks need to be thoroughly evaluated.

! Socioeconomic impacts on the receptor community should be thoroughly evaluated and balanced against the desires of Ohio to move Fernald waste.

Name
<IMG SRC 0595287AQ>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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! Transportation risks need to be thoroughly evaluated.

! Socioeconomic impacts on the receptor community should be thoroughly evaluated and balanced against the desires of Ohio to move Fernald waste.

Name
<IMG SRC 0595287AR>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Test Site.

! Transportation risks need to be thoroughly evaluated.

! Socioeconomic impacts on the receptor community should be thoroughly evaluated and balanced against the desires of Ohio to move Fernald waste.

Name
<IMG SRC 0595287AS>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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! Socioeconomic impacts on the receptor community should be thoroughly evaluated and balanced against the desires of Ohio to move Fernald waste.

Name
<IMG SRC 0595287T>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287AU>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287AV>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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- ! Transportation risks need to be thoroughly evaluated.
- ! Socioeconomic impacts on the receptor community should be thoroughly evaluated and balanced against the desires of Ohio to move Fernald waste.

Name
<IMG SRC 0595287AW>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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- ! Socioeconomic impacts on the receptor community should be thoroughly evaluated and balanced against the desires of Ohio to move Fernald waste.

Name
<IMG SRC 0595287AX>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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- ! Transportation risks need to be thoroughly evaluated.
- ! Socioeconomic impacts on the receptor community should be thoroughly evaluated and balanced against the desires of Ohio to move Fernald waste.

Name
<IMG SRC 0595287AY>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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! Socioeconomic impacts on the receptor community should be thoroughly evaluated and balanced against the desires of Ohio to move Fernald waste.

Name
<IMG SRC 0595287AZ>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287BA>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287BB>
Address

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Name
<IMG SRC 0595287BC>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287BD>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287BE>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287BF>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287BG>
Address

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Name
<IMG SRC 0595287BI>
Address

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<IMG SRC 0595287BJ>
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Name
<IMG SRC 0595287BK>
Address

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Name
<IMG SRC 0595287BL>
Address

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Name
<IMG SRC 0595287BM>
Address

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Name
<IMG SRC 0595287BN>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287BO>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287BP>
Address

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Name

<IMG SRC 0595287BQ>
Address

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Name
<IMG SRC 0595287BR>
Address
Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287BS>
Address

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Name
<IMG SRC 0595287BT>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287BU>
Address

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Name
<IMG SRC 0595287BV>
Address

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Name
<IMG SRC 0595287BW>
Address

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Name
<IMG SRC 0595287BX>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287BY>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287BZ>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287CA>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287CB>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287CC>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287CD>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Test Site.

- ! Transportation risks need to be thoroughly evaluated.

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Name
<IMG SRC 0595287CE>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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- ! Socioeconomic impacts on the receptor community should be thoroughly evaluated and balanced against the desires of Ohio to move Fernald waste.

Name
<IMG SRC 0595287CF>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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- ! Socioeconomic impacts on the receptor community should be thoroughly evaluated and balanced against the desires of Ohio to move Fernald waste.

Name
<IMG SRC 0595287CG>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287CH>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287CI>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287CJ>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287CK>
Address

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Name
<IMG SRC 0595287CL>
Address

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Name
<IMG SRC 0595287CM>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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- ! Socioeconomic impacts on the receptor community should be thoroughly evaluated and balanced against the desires of Ohio to move Fernald waste.

Name
<IMG SRC 0595287CN>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287CO>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287CP>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287CQ>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287CR>
Address
Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287CS>
Address

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! Socioeconomic impacts on the receptor community should be thoroughly evaluated and balanced against the desires of Ohio to move Fernald waste.

Name
<IMG SRC 0595287CT>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

! The more than 300,000 cubic yards of radioactive waste consisting of uranium, thorium and radium among other radionuclides, should be kept on-site in containers adequate to protect the local populace. Nevadans should not be required to accept additional risk on top of that already present at the Nevada Test Site.

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Name
<IMG SRC 0595287CU>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

! The more than 300,000 cubic yards of radioactive waste consisting of uranium,

thorium and radium among other radionuclides, should be kept on-site in containers adequate to protect the local populace. Nevadans should not be required to accept additional risk on top of that already present at the Nevada Test Site.

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Name
<IMG SRC 0595287CV>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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! Socioeconomic impacts on the receptor community should be thoroughly evaluated and balanced against the desires of Ohio to move Fernald waste.

Name
<IMG SRC 0595287CW>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287CX>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287CY>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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- ! Socioeconomic impacts on the receptor community should be thoroughly evaluated and balanced against the desires of Ohio to move Fernald waste.

Name
<IMG SRC 0595287CZ>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287DA>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287DB>

Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287DC>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287DD>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287DE>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287DF>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287DG>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287DH>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287DI>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287DJ>
Address

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Name
<IMG SRC 0595287DK>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287DL>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287DM>
Address

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Name
<IMG SRC 0595287DN>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287DO>
Address

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Name
<IMG SRC 0595287DP>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287DQ>
Address

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Name
<IMG SRC 0595287DR>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287DS>
Address

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Name
<IMG SRC 0595287DT>
Address

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Name
<IMG SRC 0595287DU>
Address

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Name
<IMG SRC 0595287DV>
Address

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Name
<IMG SRC 0595287DW>
Address

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Name
<IMG SRC 0595287DX>
Address

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Name
<IMG SRC 0595287DY>
Address

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Name
<IMG SRC 0595287DZ>
Address

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Name
<IMG SRC 0595287EA>
Address

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Name
<IMG SRC 0595287EB>
Address

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Name
<IMG SRC 0595287EC>
Address
Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287ED>
Address

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Name
<IMG SRC 0595287EE>
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Name
<IMG SRC 0595287EF>
Address

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Name
<IMG SRC 0595287EG>
Address
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Name
<IMG SRC 0595287EH>
Address

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Name
<IMG SRC 0595287EI>
Address

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Name
<IMG SRC 0595287EJ>
Address

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Name
<IMG SRC 0595287EK>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287EL>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287EM>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287EN>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287EO>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287EP>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Test Site.

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Name
<IMG SRC 0595287EQ>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287ER>
Address

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Name
<IMG SRC 0595287ES>
Address

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Name
<IMG SRC 0595287ET>
Address

Keep Fernald Waste On-site in Ohio..Comments on the Fernald Cleanup EIS.

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Name
<IMG SRC 0595287EU>
Address

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Name
<IMG SRC 0595287EV>
Address

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The following comments/issues were submitted by Pam Dunn, Harrison, Ohio. The Comments/issues were retyped and alphabetically identified by DOE in order to facilitate developing comment responses. The original hand written comments have also been included as matter for the record.

June 20, 1994
Mr. Ken Morgan
U.S. Dept. of Energy Fernald Field Office
P.O. Box 398705
Cincinnati, OH 45239-8705

RE: Comments Proposed Plan For Remedial Action OU4.

! (a) In reviewing the Proposed Plan for OU4 there are variances in the capital cost for the same treatment alternatives with the only difference being on-site versus off-site disposal. What is the source of this variance?

! (b) It is stated that EPA would review on-property disposal every five years in accordance with CERCLA requirements. Who and how often would a review be performed in the other years?

! (c) There is no mention of retri[e]vability of the materials which would be disposed of in the on-site disposal vault. Is this option being considered, and, if not, why?

! (d) Post-remediation O&M cost are estimated over a thirty-year period. What about the remaining years for which this material will require monitoring

! (e) Alternatives 2B and 4B have identical post-remediation cost, with Alternative 4B being untreated. Please explain how cost can be the same for treated versus untreated materials disposed in an on-site vault.

! (f) There is discussions on interim storage. What is the estimated time for this interim storage?

! (g) Alternative 2C states that the contaminated materials would be place in bulk (without packaging) into the on-site disposal vault. Please expand on why this material would not be packaged and state the advantages/disadvantages of packaged versus non-packaged.

! (h) It is stated that non-porous material will be released from the site as uncontaminated per DOE Order 5400.5. Will this material be checked for contamination prior to release or just assumed to be uncontaminated and released?

! (i) Will the wastewater generated during remediation be treated for non-radioactive contaminates prior to discharge in the Great Miami River? To what extent will radioactive and non-radioactive elements be removed prior to discharge?

! (j) A material variance in the cost associated with Subunit C exist between 3C.1 and 3C.2 with the only apparent difference being 3C.1 Disposal at NTS and 3C.2 at Envirocare in Utah. Please explain this variance and if this is partially due to more stringent requirements at NTS, should these more stringant requirements also be required at a commercial facility? Which requirements is more protective? It is also stated that an exemption from DOE Order 5820.2A (this is transposed as 5280.2A in document, Page 56) is needed to dispose at a commercial facility; has this been granted?

! (k) Will notification of these shipments be given to the areas involved in the transportation routed for rail and truck, and what precautions for protection will be employed?

! (l) Table 6-1 comparison of remedial alternatives, state differences in implementing identical treatments with different disposal options. Is this difference related to transportation issues for off-site rather than on-site? Please explain these differences. Also, Subunit C lists no treatment for all alternatives; pleese demonstrate why no treatment is acceptable.

! (m) Is there potential for failure of the vitrified material has the radionuclides trap[p]ed continue to delay, and if so, what is that risk?

! (n) It states that the capital cost associated with the on-site disposal facility has been removed. Where is (will) this cost be accounted for?

! (o) Line 14, Page 67 reads results in significant reduction in the volume... This would read better if the "a" preceded significant/rather than follow.

! (P) Please define the following statement (Line 16, Page 67) utilize permanent solutions to the maximum extent practical. What viable, permanent solutions presently exist?

! (q) Basis for stating long-term environmental impacts of permanent disposal at NTS are minor and no long-term impacts of biota expected from disposal activities at NTS. It is stated that to reduce U-238 to essentially background is not feesible; it also states that it is assumed that the federal government retain ownership of the FEMP site to consider clean-up protective. While I do not have a problem with these statements, it does bother me that no formal statement has been made publicly concerning this. These two statements present future land use constraints which must be-addressed. Why hasn't the DOE adopted a formal position concerning this issue and communicated this to both the Fernald Citizens Task Force and the community?

! (r) Line 13, Page 76, reads "... would bot be ...", should that read "... would not be ..."?

! (s) It states the on-site, above-grade disposal facility would be designed for a 1000 year life with no active maintenance. What is the half-lives or duration for which the radionuclei and chemical contaminants are a threat to the environment; do they exceed 1000 years? Also, explain why no active maintenance is assumed for 1000 years.

! (t) Has an exemption to the Ohio Solid Waste Facility requirement been requested, and if not, when will such a request be made? Also, Line 28, Page 79 would read better if "the" or "a" were added to precede disposal. (For disposal facility on the FEMP site.)

Should you have any questions concerning these comments, feel free to contact me at the address given below:

Submitted by
Pam Dunn
7781 New Haven Rd.
Harrison, Ohio 45030

cc:
Mr. John Applegate
F.R.E.S.H., Inc.
File

<IMG SRC 0595287GJ>
<IMG SRC 0595287GK>
<IMG SRC 0595287GL>
<IMG SRC 0595287GM>

OhioEPA
State of Ohio Environmental Protection Agency

Southwest District Office
40 South Main Street
Dayton, Ohio 45402-2066
(513)286-6357
FAX (513)285-6404

George V. Voinovich
Governor

April 19, 1994

RE: PUBLIC COMMENTS
O.U.4 PROPOSED PLAN

Mr. Ken Morgan
Public Relations
U.S. DOE FEMP
P.O. Box 398705
Cincinnati, OH 45329-8705

Dear Mr. Morgan:

The purpose of this letter is to provide official comments on the Operable Unit 4 Proposed Plan:

1. The OU4 Proposed Plan is the culmination of efforts by U.S. DOE, Ohio EPA, and U.S. EPA to understand and develop a plan for mitigating releases to the environment from OU4. The alternative selected in the Proposed Plan will address potential and actual releases in a manner protective of human health and the environment.

2. DOE should commit to including and/or developing real-time monitoring for discharges to the environment resulting from remedial actions including any treatment system. DOE should attempt to incorporate any new developments in real-time monitoring from the Office of Technology Development. Data obtained from real-time monitors and any additional monitoring activities should be provided to the Ohio EPA and public in a timely manner.

3. DOE should attempt to incorporate pollution prevention activities whenever possible during the design and operation of the OU4 remedial action system. All available methods to reduce or eliminate discharges from the treatment system should be considered during the design of the system.

4. DOE must ensure the public that their involvement will not be diminished during Remedial Design and Remedial Action (RD/RA). DOE should commit to continued public involvement during RD/RA within the Record of Decision for OU4.

5. DOE should revise the site Community Relations Plan to address the need for continued public involvement during the RD/RA. Ohio EPA looks forward to working with DOE to revise this document.

If you have any questions about these comments please contact me.

Sincerely,

Thomas A. Schneider
Project Manager

TAS

cc: Lisa Crawford, FRESH
Jack Van Kley, Ohio AGO
Jim Saric, USEPA
Ken Alkema, FERMCO
Lisa August, Geotrans
Jean Michaels, PRC
Jenifer Kwasniewski, OEPA/DERR
Jeff Hurdley, OEPA/Legal
Robert Owen, ODH

<IMG SRC 0595287GN>

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:
AUG 02 1994
Ms. Randi Allen ME-19J
Department of Energy
Post Office Box 398704
Cincinnati, Ohio 45239-8704

Dear Ms. Allen

This will confirm the substance of our recent telephone conversations concerning this Agency's review of the Department of Energy's proposal for implementing activities including reactivation of certain power generating facilities at the Fernauld site.

As discussed with you, the Draft Environmental Impact Statement (EIS) for this project was never received in this Branch. In this regard, the Planning and Assessment Branch has been designated as the official contact point within Region V for provision of comments on Federal projects as required pursuant to Section 309 of the Clean Air Act and/or the National Environmental Policy Act. The official comment period for this Fernauld project expired 45 days from the date a notice of the EIS's availability was published in the Federal Register. In the meantime, however, the document was received, reviewed, and commented upon by staff of our Waste Management Division with regard to those aspects of the project for which Waste Management Division has special concern.

Given expiration of the official NEPA comment period for this project's EIS, the only comments on the record from our Agency are those previously supplied to you from our Waste Management Division. At this point in time, given the requirements of NEPA and its implementing regulations, those comments will have to suffice as our Agency's comments. Provided that the comments previously provided by our Waste Management Division are complied with, and further provided that facility in question is subsequently operated in full accordance with applicable local, State, and Federal requirements, it appears unlikely at this time that any significant adverse impacts on the environment can reasonably be foreseen.

We look forward to receipt of the project's forthcoming Final EIS. OUr Agency's comments on the Final EIS will be provided on a timely basis. If you have any questions, please do not hesitate to contact me at 312/886-7342.

Sincerely yours,

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ATTACHMENT C.II

ERRATA SHEETS AND CHANGES TO THE FEASIBILITY STUDY/PROPOSED PLAN-DRAFT ENVIRONMENTAL IMPACT STATEMENT

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C.II ERRATA SHEETS AND CHANGES TO THE FEASIBILITY STUDY/PROPOSED PLAN-DRAFT ENVIRONMENTAL IMPACT STATEMENT

The FS/PP-DEIS for Operable Unit 4 was released for public comment in March 1994. The DOE reviewed all written and oral comments submitted during the public comment period. Upon review of these comments, it was determined that no significant changes to the remedy, as was originally identified in the FS/PP-DEIS, were necessary. However, it should be noted that the repromulgation of 40 CFR §191 by the EPA, did result in minor changes in the comparative analysis of alternatives presented in the FS/PP-DEIS. Likewise, in May 1994 five final concerns were received from the EPA on the Operable Unit 4 FS/PP-DEIS. In responding to these five concerns, Table D.3-5 in Appendix D of the Operable Unit 4 FS/PP-DEIS was revised. The revised table is included in this Attachment. The following discussion addresses the nature and extent of these changes.

C.II.1 REPROMULGATION OF 40 CFR §191

Repromulgation of the 40 CFR §191 requirements for Management and Disposal of Spent Nuclear Fuel, High-Level, and Transuranic Wastes has caused changes to be made to the ARARs as described in the Draft Final FS/PP-DEIS, conditionally approved by the EPA on February 9, 1994. DOE chooses not to submit revision pages to the FS/PP-DEIS; all changes to the ARARs for that document and any impacts from the repromulgation are discussed in this section of the Draft ROD. Since the repromulgation resulted in relevant and appropriate, rather than applicable requirements, the repromulgation of 40 CFR §191 will not impact the proposed off-site alternative for disposition of the K-65 material. However, the on-property disposal alternatives (Alternatives 2A/Vit and 2A/Cem) that were previously retained, having passed the threshold criteria of the detailed analysis, are no longer able to meet the threshold criteria of compliance with ARARs, and are consequently dropped from further consideration. Subsequently, all references to Alternative 2A are therefore deleted from reference in the text of the ROD, and in the Appendix A.

The only relevant and appropriate requirement from 40 CFR §191 that is retained as an ARAR in this ROD (Appendices A and B) for the proposed alternative is 40 CFR §191.03(b), which establishes dose limits for management and storage of the K-65 material. However, since this ARAR is relevant and appropriate, rather than applicable, it will pertain only to the on-property portions of the remediation.

Background

The United States Department of Energy - Fernald Field Office (DOE-FN) received conditional approval of the Draft Final FS/PP-DEIS for Operable Unit 4 from USEPA on February 9, 1994. Included in the FS/PP-DEIS applicable or relevant and appropriate requirements (ARARs) was a reference to 40 CFR §191, "Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level, and Transuranic Wastes". This reference to 40 CFR §191 was modified in the Operable Unit 4 FS/PP-DEIS, submitted in February 1994 in response to the conditional approval letter, to reflect the changes to the regulation that occurred upon its repromulgation on December 20, 1993. It still accommodates the specific direction previously provided by the USEPA regarding incorporation of the 40 CFR §191 requirements as an ARAR/TBC ("Operable Unit 4 Screening Dispute Resolution U.S. DOE Fernald", Catherine McCord, USEPA, to Andy Avel, DOE, dated October 18, 1990). The final rule became effective on January 19, 1994, during final revision of the Operable Unit 4 FS/PP-DEIS, and agency comments did not address the repromulgation of the rule. This fact was discussed with the USEPA, and a DOE position paper on the incorporation of 40 CFR §191 as an ARAR for Operable Unit 4 remediation was submitted to the USEPA for concurrence. The USEPA disagreed with the draft position proposed by DOE, and responded with a directive to incorporate the substantive elements of the repromulgated rule into the ROD, with an option to resubmit change pages to the FS/PP-DEIS ("Application of 40 CFR §191 to OU #4", Jim Saric, USEPA, to Jack Craig, DOE, dated April 25, 1994). DOE elected not to revise the FS/PP-DEIS, but rather to describe in this section of the ROD changes to the table of ARARs and associated impacts on selection or implementation of remedial alternatives that have occurred between the time the Draft Final FS/PP-DEIS was conditionally approved, and the submittal of the ROD to the USEPA and OEPA. The list of ARARs in the Draft ROD, and proposed approach to compliance with the substantive elements thereof, once approval by the USEPA is obtained, will be the final approved list of applicable or relevant and appropriate requirements for final remediation of Operable Unit 4.

Impacts of Repromulgation

Since 40 CFR §191 cannot be considered a legally "applicable" class of ARAR for this CERCLA remediation, §191 is not applicable to any Operable Unit 4 waste streams. Since compliance with only applicable requirements is required to be demonstrated for off-site remedial alternatives proposed under CERCLA, these requirements will not impact the proposed off-site alternative for disposal of the treated K-65 material at the NTS.

DOE previously included 40 CFR §191 Subpart A as a relevant and appropriate requirement, and Subpart B as to be considered (TBC) criteria for management of K-65 material in accordance with guidance received from the USEPA. Subpart A of §191, entitled "Environmental Standards for Management and Storage" includes public dose rate standards for protection of the public from radiation hazards posed by spent nuclear fuel, high-level, or transuranic waste material. The repromulgation of the Final Rule did not materially affect the sections of Subpart A referenced in the Operable Unit 4 FS/PP-DEIS; the Subpart A requirement referenced in the Operable Unit 4 FS/PP-DEIS remains unchanged in the table of ARARs as a relevant and appropriate requirement for the on-property portion of the remedial activities to be conducted on the K-65 material.

Prior to repromulgation, Subpart B requirements were in remand, and were therefore considered TBCs in the FS/PP-DEIS submitted to the agencies. Since Subpart B of §191, entitled "Environmental Standards for Disposal", has been repromulgated, the USEPA has directed that sections must now be considered as relevant and appropriate requirements for any on-property disposal alternatives. Since it could not be demonstrated that the on-property disposal of treated K-65 material would comply with specific requirements of this Subpart, those alternatives involving on-property disposal (Alternatives 2A/Vit and 2A/Cem) were no longer able to meet the threshold criteria of compliance with these ARARs, and were consequently dropped from further consideration. All descriptions to Alternative 2A are therefore deleted from reference in the text of the ROD, and in the Appendix A.

A new Subpart C of §191 "Environmental Standards for Groundwater Protection", was created by the repromulgated rule. As with Subpart B, this new Subpart pertains only to disposal systems. The elements of this Subpart must now be considered as relevant and appropriate requirements; however, since the on-property disposal alternatives to which this Subpart pertains were dropped from further consideration on the basis of non-compliance with Subpart B requirements, and since Subpart C will not pertain to any off-site disposal alternatives, these requirements will not be included in the Appendix A or B tables of ARARs. Subpart C will have no effect on the selected alternative, which includes off-site disposal.

C.II.2 ERRATA SHEETS TO THE OPERABLE UNIT 4 FEASIBILITY STUDY/PROPOSED PLAN-DRAFT ENVIRONMENTAL IMPACT STATEMENT

In the course of obtaining EPA's approval of the Operable Unit 4 Feasibility Study/Proposed Plan-Draft Environmental Impact Statement, several iterations of specific comment responses were required to fully address five remaining EPA concerns.

On May 9, 1994 the EPA approved the Final Operable Unit 4 Feasibility Study Report and Proposed Plan based upon the satisfactory resolution of five remaining concerns. Only the resolution of one of the five remaining concerns resulted in an action by the DOE, which involved the revision of two pages to the Operable Unit 4 Feasibility Study Report/Proposed Plan-Draft Environmental Impact Statement.

In the May 9, 1994 approval letter, the EPA noted that previously agreed upon changes related to the Operable

Unit 4 FS, Appendix D, Table D.3-5 were not made in the revised final document per resolution. Specifically, the surface area (SA) values presented for the Dermal Contact While Bathing pathway in Table D.3-5, were not reflected in the Final Operable Unit 4 Feasibility Study/Proposed Plan-Draft Environmental Impact Statement document. In addition, the EPA noted that footnote "h" of Table D.3-5 was incorrect; the referenced pages were not consistent with the cited EPA document.

The following DOE response was accepted by the EPA on this matter:

"This table (D.3-5) was derived from the OU4 Baseline Risk Assessment, but the latest change for this dermal exposure pathway was not made for this table. This will have no impact on the OU4 FS risk assessment as the only contaminant which was considered for the groundwater pathway was U-238. Since radionuclides are not evaluated for dermal absorption pathways, this parameter change will not change the risk values."

In accordance with this resolution the DOE issued the following revised pages to Table D.3-5, which included the corrected surface area value of 23,000 cm3 and the corrected footnote "h".

ATTACHMENT C.III

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ATTACHMENT C.IV

PUBLIC MEETING TRANSCRIPT

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US DEPARTMENT OF ENERGY

PUBLIC MEETING

MONDAY, MARCH 21, 1994

THE PLANTATIONS, HARRISON, OHIO

MR. STEGNER: Good evening. Thank you for coming. My name is Gary Stegner. I work at the Department of Energy at Fernald. Tonight we're going to be discussing Operable Unit 4, which are the silos, Silos 1 through 4 including the basic five silos.

Briefly, very briefly, the way we're going to set the evening up is, if you look at the agendas on your chair, we'll start off with a series of presentations which should last about a total of about 45 minutes.

Following the presentations we'll have an informal question and answer section. This is informal as distinguished from the formal comment period that will follow. During the informal session, it will be a give and take with the panel and any of the other experts who we might have out there in the audience to answer your questions regarding Operable Unit 4. We do want to keep focused as much as possible on Operable Unit 4.

Following the informal questions and answers, what we'll do is take a break for about 10 or 15 minutes. Then we'll come back, and then we'll have the formal comment period. The formal comment period is for the record. You know, it is something that will be included in our Responsiveness Summary, and it will be included in the Record of Decision for Operable Unit 4.

Before I introduce the panel tonight, a few logistical announcements. People will remind, I think everyone is registering at the door as they come in. If you want to make a formal on the record comment, please designate that when you sign in. The way I will do that is, following the break when we begin that, I will go through there and find out the number of people who want to and I will call them up.

Don't think that you have to come up here to the microphone tonight to make your formal comments because there are comment cards on your chairs. Also you can give those to me after the meeting. You can send them to Amy at the Department of Energy at Fernald, and you can also just write out your comments and send them to us at the Department of Energy at Fernald. We ask that you have those to us by April 20th, however.

I think there is ice water someplace

in this room. Rest rooms are out the door there. There's also a pop machine if you want to get something to drink during the break. We encourage you to take the handouts that we have scattered throughout the room, if you want to find out more about Operable Unit 4.

So let me get on with introducing our panel tonight. We have Randi Allen, who is the Operable Unit Four Manager for the Department of Energy here tonight. Wilf Pickles, her counterpart with FERMCO, the manager there. We have Ed Skintik, Regulatory Compliance for the Department of Energy. His counterpart, Eric Woods, FERMCO reformatory programs; and also Dennis Nixon, the Assistant Unit 4 Director. So without further ado, I will turn it over to Randi Allen.

MS. ALLEN: We also have Eric Woods who worke for FERMCO. All I'm going to do here real quick in case there's anybody in the audience that is not that familiar with Fernald, I,m just going to introduce you to the operable units, and then turn it over to Dennis Nixon. He's going to go through some details on Operable Unite 4.

Sure everybody has seen this before. This is just to show you the location of the Fernald. It's a 1,050 acre site located about 17 or 18 miles northwest of Cincinnati. What I'd like to do here real quick is just run through the other operable units to you, and then I`d like to present a schedule. We're going to have a similar meeting for all the other operable units in a little bit of a later time scale here. I'll show that to you in a minute.

Operable Unit 1, which you see in the orange, is the waste pits, and Operable Unit 2 is called other waste units. That's the flyash piles, the south field, the sanitary field, and lime and sludge fields. Operable 3, that's a bigger operable unit. That's all the facilities located on the site. Operable Unit 3, is obviously the silos, one of the smaller units. And Operable Unit 5 is everything also not shown on the grid, environmental media, the soils, and the ground well.

Here's a schedule for the other operable units. As you can see, in the yellow is the period between like whenever you see the remedial investigation report, that's when the documents are beginning to become available for review by the public. Operable Unit 4 down there, we're right now between the feasibility stage, proposed plan. We`ve initiated preparation of a Record of Decision.

Some places you see the feasibility study, and shortly thereafter the US EPA, the DOE headquarters, and the Ohio EPA will review and comment on the document and approve the document. It becomes available for the public to review, and they'll have this type of evening for each one of the other operable units.

This is the process we go through to get in the file remediation. Actually, this is a pretty simple version of it, if you can believe it. Right now in Operable Unit 4 we are right here in beginning preparation of the Record of Decision. So we're getting ready in the near term to issue the Record of Decision of Operable Unit that gets submitted to the US EPA and Ohio EPA in June of this year.

After that, once we have reached an agreement on what that Record of Decision should say, the comments you provide on this proposed plan are incorporated into that document. So once we issue that Record of Decision, we will begin final remediation.

At this time what I'd like to do is introduce Dennis Nixon, and he is going to run through the documents you guys have been asked to review.

MR. NIXON: Good evening. What I'm going to do, present this evening, is a brief history of Operable Unit 4 and how we got to where we're at today. As Randi said, Operable Unit 4 is one of five operable units at Fernald. It's located on the western portion of the site next to Paddy's Run Creek. This is an areal shot of the operable unit area.

There's a geographic area encompassing the four waste storage silos. K-65 silos, which you'll see to the south, here Silos 1 and 2 contain the K-65 residues. Silo 3 is -- contains the cold metal oxide material. Silo 4 is empty and was never used.

The operable unit also consists of a radon treatment system and underground decant sump tank that was used in the process of filling the silos, the surfaces soils, subsurface soils, and the berm soils, as well as any perched water that may be encountered during the final remediation.

The silos were constructed in 1951 and 1952 for use as interim storage vessels for defensive program waste that was being produced at that time at the Melloncrock Chemical Works in St. Louis.

I have a group of shots on the construction I`ll just run through. This is a -- I believe the foundation being prepared for Silos 4, 3, 2, looking south. The silos were constructed -- Silos 1 and 2 were constructed in the winter months, which caused some problems within the construction, causing problems with shutting down the concrete pours which resulted later in cold joints, which when they stopped pouring the concrete, which we'll show you in later pictures, that later would form cracks in the sides of the silos.

Silos 1 and 2 during the construction phases, shot looking to the west during construction. The silos were filled during up till

1958. If you'll notice the cracks on the south face where those cold joints in the construction occurred. Essentially due to those cracks, there later was an asphaltic cover. Here again the cracks in the sides of the silos looking to the north, Silo 1, 2, and 3.

In 1964 those cracks were sealed with a Gunite material, and then an asphaltic sealant was placed on that, and the first of two berms were added. The berms were added not only for -- They were mainly added for structural stability. They were also there to provide sone shielding due to the radiation that was given off by the silo material. The decant sump tank, which was a buried tank, this is the -- an accese way, a corrugated pipe that was used to access that tank after the berm was added.

And this is an areal shot of the original berm. Again, the K-65 silo is here. In 1983 that berm, the original berm, had resided, and we had another berm added in 1983 due to the erosion problems. Furthermore, in 1987 these dome cape were placed on the K-65 silos to enhance the structural integrity of the dome itself. The foam was added to insulate the silos and to assist in the radon problem, which we'll talk about a little later.

Again, in 1991 -- I'll talk about the history, is the clay that was added. We had a removal action in 1991. Due to the radon concerns, the chronic radon emissions, as well as concerns of the silos collapsing and releasing material, we added a one-foot layer of bentonite clay to the residues.

As I said, the material was added up until 1958 In the silos. The majority of the material, as I said, was processed at -- the K-65 material was processed at the Melloncrock Chemical Works in St. Louis. Essentially, they had a problem in St. Louis with storage. So we constructed the silos at Fernald for storage of that material. It was shipped fron Melloncrock as well as Lake Ontario Ordinance Works to the Fernald site.

You can see here the incoming drums that were received at the site. Those drums were slurried in the drum handling building. They were reslurried, pumped ln the silo. That material was allowed to sit over night, essentially, and the liquid was decanted off into the decant sump tank that I spoke of earlier.

As well, some K-65 material was processed at Fernald in our refinery. Those raffinates were pumped in a liquid form through the trench that you see here running east west to Silo 2.

The Silo 3 material was all processed on site here in our refinery at Fernald. Those raffinates were unlike the K-65 material, would calcine at a very high temperature and would rot, and would pneumatically convey through the same trench to the pipe ln Silo 3.

The K-65 material generally takes the form of a wet clay material ranging from gray to brown. It is defined as technically as 11E2 by-product material under the Atomic Energy Act, which makes that an exception from the RECRA regulations, even though we do consider RECRA as a helpful and appropriate requirement.

The material in K-65 silos generally the contaminates of concern are radium, thorium, and lead-210. Due to that radium content, the residues give off a considerable amount of radon gas, which again was the reason for the removal action to add the one-foot layer of bentonite clay in 1991.

There are elevated-concentrations in the residues, the untreated residues, of barium and lead. There are very low concentrations of PCB and tributyl phosphate used that probably occurred during the processing at the refinery or at the Melloncrock Chemical Works.

Total volume of material, including Silos 1 and 2, including the bentonite clay is roughly 8,900 cubic yards. In your packets you have tables from the remedial investigation, the actual characteristics of the residues themselves. I won't go over those tonight.

The Silo 3 material is called cold metal oxides. As I said, those are a dry powdery material like a talcum powder, again defined technically as 11E2 by-product material, the much lower concentrations of radium nuclides in the Silo 3 materials.

The predominant contaminates of concern here are the thorium-230, uranium, and lead-210 again. The Silo 3 material also leaches rare earth metals listed here. Little to no organics in the Silo 3 material due to that high temperature calcine process.

And here the total volume of Silo 3 material, approximately 5,000 cubic yards, for a total residue volume of roughly 13,000 cubic yards to be processed in our final remediation. Again, I have the tables of the characteristics of that waste.

In addition to the residues, Operable Unit 4 will remediate surface soils, contaminated surface soils, contaminated berm soils, the subsurface soils below and surrounding the silos, and again any perched water that is encountered during the final remediation.

As Randi said, we are in the process of a remedial investigation feasibility study. We currently have completed our remedial investigation. It is conditionally approved by the US EPA. The feasibility study and the proposed plan have been completed, and again are conditionally approved by the US EPA.

We are at the phase that we are

getting the public comments, public involvement in our proposed plan, and responding to the comments. We are making progress with our Record of Decision based on this proposed plan. It's due to the agency in June of this year. That will include a Responsiveness Summary which will respond to the questions and comments that are raised tonight and in other meetings or other discussions, formal commments.

And then after that Record of Decision, hopefully by October, November time frame of this year, we'll have a Record of Decision. We'll be moving forward into the remedial design and remedial action phases of the project.

All of the points are important that we make and go into detail with later. The documents that have been prepared today are fully integrated with the NEPA process and act as the site's draft of the Environmntal Impact Statement.

In the feasibility study, we evaluated a full range of alternatives, you know, alternatives that included on-site and off-site disposal, various treatment options, and the DOE proposed alternative, preferred alternative, is as follows:

Essentially, the major components of that preferred alternative are to remove the residues from the silos, stabilize those residues by the use of vitrification and dispose of those -- thet vitrified waste off site at the Nevada test site.

Again, we evaluated a full range of alternatives, and those alternatives were evaluated under the nine criteria which were provided by CERCLA. We're currently involved with the modfying criteria, which is to get the public involved. Again, the major components, to remove, treat, and dispose of the materials in the silos; but in addition to that, we're going to be demolishing. After the residues are recovered and treated, we'll be demolishing and decontaminating the silos themselves, the remediation facilities required.

We'll be excavating any contaminated soils, that's surface and subsurface soils, the perched ground water. And then, of course, the disposal of the soils and debris will be consistent with the Operable Unit 3 and Operable Unit 5 Records of Decision, respectively. They will not be finally disposed of with this operable unit.

As for the cost of this action, the cost ia roughly $90 milllon from start to finish, which is made up of the capital cost for the facility as well as various remediation costs and operations and maintenance costs.

This is the schedule. Essentially, we are at the end of the proposed plan period. We are entering into the Record of Decision. We have a draft Record Decision right now at the DOE headquarters that's being reviewed. We have initiated some work on the remedial design work plan based on this proposed plan.

Following the Record of Decision, we will go into full-blown remedial design, and then, of course, remedial action will follow. The construction you see here, the construction phase, will be roughly through March of 1997.

We'll initiate the remedial operations shortly thereafter, and the facilities will operate roughly until the year 2,000. After the operations are complete, this is the period in which we demolish and decontaminate the facilities that were used to treat and stabilize the materials.

There are a couple of key questions, my last couple of slides here, that need to be anewered. Why remove the silo waste at all? I think everyone that's involved with this, this project, will agree that the silo materials need to be taken out of the silos and put into a safe configuration.

The silos have questionable structural integrity. There is the potential, always the potential, for a continued leakage from the silos, proposes an unacceptable risk to both the off-site residents as well as any future trespassers for the site.

After they've been removed, why vitrify these wastes? Vitrification is a very -- it's a proven technology, and due to our extensive rehabilitative studies, we found it to be a very good treatment technology for the K-65 silo materials. The silo K-65 materials have high silica contents which is very conducive to this process.

There is significant volume reduction. There is up to a 60 percent reduction when vitrifying the K-65 materials. We have significant reduction of radon emanation rate. Essentially, once the material has been vitrified, it hes the radon flux of the common building materials like bricks and wood.

It also reduces the leachability of metals that are in the material. For example, those metals we are concerned with listed here, the untreated waste, the leaches in excess of the RECRA maximum allowable concentration; after vitrification all well below the regulatory limits. Radon emanation rate, very high for the untreated waste, and it is obviously a significant reduction there.

That's all I have for you this evening. I'd like to introduce Eric Woods, who's going to talk in detail on the process in which we integrated the CERCLA and NEPA in these documents.

MR. WOODS: Good evening. What I'd like to do is provide a short presentation on CERCLA/NEPA integration, basically focusing on three thinge: a little bit about the history of

NEPA compliance at the site, and then look at the Operable Unit 4 feasibility study and proposed plans specifically and kind of walk through how we are integrating NEPA into these documents, and then, lastly, provide a summary of the Operable Unit 4 environmental impacts and the cumulative environmental impacts.

So we're all on the same page with respect to NEPA, NEPA is the National Environmental Policy Act signed into law in January of 1970. The goal of NEPA was to provide a national policy on protection of the environment, and one of the specific aspects of NEPA in order to accomplish this goal is that it established a process by which federal agencies, such as the Department of Energy, will need to consider environmental impacts when they made decisions.

This is formally known as the Environmental Impact Statement Process, what we're going through here for Operable Unit 4, and a very important aspect of that is the public involvement aspect.

The first Environmental Impact Statement proposed at the Fernald site was a renovation EIS. When the site mission changed from production to remediation, the need for this document went away, and the Department of Energy subesquently canceled the renovation EIS.

As I said, the mission was changing at that point from production to remediation, and there was still the need to address NEPA for the clean-up activities that were being planned at that time. Therefore, the Department of Energy issued a second notice of intent in May of 1990. This was followed by scoping meetings in June, and this basically announced that it intended to prepare an Environmental Impact Statement for the Operable Unit 4 remedial activities.

This document was designed or was planned to do a couple of things. Mainly, it was to look at the environmental impacts of the Operable Unit 4 alternatives, specifically, and reach a decision for OU4 and OU4 only.

However, because it was the lead EIS or the first of five integrated documents to be prepared at the site, it was also to address cumulative impacts, and we'll walk through the document and I'll show where and how we've done that.

I'll mention that the remaining operable units, 1, 2, 3, and 5, will also be prepared as documents at a lower level, and we'll make decisions for those operable units specifically.

I think a key question is, why did we integrate, why not do an individual EIS process and an individual RI/FS process? The main reason is there's a similarity between the two. The RI/FS process under CERCLA, there's an awful lot of the same things we need to do with the EIS under NEPA. Primarily, NEPA evaluates the site, the alternatives to reach an end goal, and it does mention some of the criteria we look at. In the end it identifies preferred alternatives. These are similarities in the two.

There are some differences, primarily in the way the alternatives are evaluated, and where these differences occur is where we simply utilize the CERCLA framework and infuse or integrate NEPA into the documentation.

This does several things for us. It avoids duplications, the duplications of preparing two separate documents. It also minimizes the potential for inconsistencies, and it's consistent with DOE policy.

Looking specifically at the Operable Unit 4 documentation, I want to point out the various parts of the document where NEPA has been infused or integrated. The first place is right up front in the Executive Summary in the introduction in Chapter 1.

We provided a discussion of CERCLA/NEPA or NEPA/CERCLA integration, basically what role the various documents play, why we do this, how the remaining operable units will follow. This just gives an overview of the process.

The next place where we have integrated NEPA is in Chapter 4. This is really the most important part of the document from the NEPA perspective. This is where we identify environmental impacts that we anticipate for the alternatives that have been identified.

Basically, as you go through the alternatives, there is a short-term effectiveness discussion and a long-term effectiveness discussion for each alternative. Under short-term we provided an analysis of the environmental impacts anticipated during remedial activities. And then in the long-term effectiveness section, we provided an analysis of environmental impacts that are anticipated after remedial activities are complete.

When we evaluate environmental impacts, these are some of the criteria we look at. As you go through the document, you will see short-term environmental impacts, just this is a format of the evaluation you will see. Rather than talk through these, I thought I would provide some photographs to kind of illustrate what we're talking about.

This slide illustrates several things. This is Paddy's Run. Obviously, water quality is related to Paddy's Run. Also the belton kinq fisher and the various habitats of biotic resources which evaluate wildlife, wildlife habitat, any species that may be listed at the state or federal level protected.

Also flood planes, there are flood planes we must deal with along the Great Miami

River. There's also flood planes along Paddy's Run. Flood planes extend to various points on the banks of Paddy's Run depending on what the topography is like in that area.

Another example of biotic resources is this overhead. This is along the eastern portion of the site, and this basically shows a typical field or pasture type habitat we have, and as we went through the cumulative impact analysis and for the purposes of that analysis looked at the possibility of on-site disposal, this was typically the kind of habitat that we identified being disturbed.

Another important aspect is cultural resources. Cultural resources could be historic or prehistoric artifacts, such as projectiles or some of the ceremonial pieces that are identified on this overhead. They also could be structures such as homes that this area is very rich in cultural resources, and we have an active program to insure that we don't impact these types of things.

This is another shot of the flood plane area. This is along the Great Miami River. You can see the site in the distance. It's upside down. The flood planes obviously extend in the flat, cultivated fields adjacent to the Great Miami River, and what we're concerned about when we look at flood planes is basically changing elevations.

A flood, if it were to occur, either a hundred-year flood or a 500-year flood, it's typically accustom to proceeding a certain distance from the river, in the case of Paddy's Run from the stream. If we change elevations significantly, the water can no longer go where it was accustomed to going and will magnify down stream floods.

Kind of hand in hand with the flood planes are wetlands. This is a typical wetland that we have on site, basically this drainage ditch with the cat tails. We have about 35 acres of wetland on the Fernald site, and approximately 10 to 15 fall under this category of drainage ditch wetlands. There's a larger area of forested wetlands in the northern part of the site, which are a little bit higher quality than this.

When we look at impacts in the Operable Unit 4 document, both specific and cumulative related to all of the operable units, drainage ditch wetlands are primarily wetlands that could be impacted. Wetlands on site are shown in red. This is a large area of forested wetlands I was speaking about.

We're taking steps, as we did very early on in the process, to avoid this wetland area. However, if we cannot avoid this area, we're developing a strategy to compensate for the loss of wetlands. We're going to be negotiating that with the Army Corps of Engineers and various other agencies. So those are just some of the kinds of things we look at as we go through our impact analysis.

Back to the document itself, also in Chapter 4, at the end of Chapter 4, we have several short sections that we've added to comply with NEPA guidelines. These are irreversible, irretrievable commitment of resources and several others. So that essentially takes care of the body of the feasibility study.

As I said, this document is functioning for the Environmental Impact Statement at the site. So the other aspect of it is cumulative aspects that occur in Appendix I in the feasibility study. We've taken remedial alternatives, the latest information we had available, and provided an analysis of the impacts related to the overall remediation of the site.

Obviously, we're going to be proceeding through the RI/FS process for the other operable units. Decisions will be made for those other operable units, and that -- the decisions that are made at the very -- from the LRA's that we've utilized for our evaluation in Appendix I. If that happens, we'll update this analysis and provide it for future feasibility studies for submittance for other operable units.

Looking at some of the impacts we anticipate for OU4 specifically, alternative, as Dennis discussed, was removal, vitrification of the contents of the silos, removal and on-property disposal contingent upon decisions in OU3 and 5 for storage.

Basically, there's an overall beneficial impact for eliminating or controlling the source or potential source of contamination of the silo, contents in the silos. On the negative side, the excavation of tho Operable Unit 4 area and the potential excavation for on-site disposal facility will result in less than 15 acres of the site being disturbed in the short term. Depending on the decisions that are made in Operable Unit 3 and 4, a portion of these could be committed in the long-term for disposal. Also potential for a small area of wetlands to be disturbed as a result of the excavation activities. Again, we're looking into compensating for the loss of these wetlend areas.

And minor increases in traffic due to goods and materials, fill material, being brought on to the site. This is on the order of ten trips per day for the life of the remedial activity. And those we've identified as substantive. There are others, some of the other categories are evaluated and discussed in the document as well.

As far as cumulative impacts go, again, an overall beneficial impact due to the elimination of sources of contamination. Due to the potential sources to the air, water, and soil, again, we're looking at all five operable units being remediated.

So we've got a larger area that will be disturbed during that activity up to 250 acres. And, again, the LRA's s that we use for this evaluation primarily looked at on-site disposal. So this is somewhat of a worst case scenario.

Hand in hand with the disturbances at the site, a portion of habitat, such as the field habitat I showed in the overhead previously, and some forested areas in the northern part of the site would be disturbed.

We do have -- Probably the most important impact we need to identify is, we do have the potential to lose most of the wetland areas on the site. We are trying to work with the various crews to insure or to the extent possible avoid the wetland areas. Wetlands that we do lose due to excavation or commitment of land, we will begin to compensate or mitigate the loss of those areas.

In the area of socioeconomics, which looks at impacts from the action to the local or area economy infrastructure such as public services, we do expect a significant amount of material to be purchased in the area.

And in addition, we've done a lot of evaluation as to the level of work force at the site, and we expect the level to stay fairly consistent through the life of the remedial activities. Therefore, socioeconomics in the short term should be primarily beneficial. And as we complete remedial activities, the need for a lot of the work force will decline, which could result in minor socioeconomics after the activities are complete.

That concludes my presentation, and I'll turn it over to Randi Allen.

MS. ALLEN: I just have a couple slides here. These are the last three slides in your package, and I promise I'm not going to go through all of those. Sitting up there looking out at you guys, looks like not a moment too soon I'm winding up this packet here.

This is really what we've gone through in Operable Unit 4 so that we could relate what we are intending to do with the residue to advise you out there. Initially starts back when we submitted the document to US EPA and Ohio EPA, the document and the EIC.

Essentially, what we've gone through here is beginning really in October, we have tried to meet with the public to tell them what is in the proposed plan and the feasibility study, and have gone through really risk assessment, ground water, and different little round tables I guess.

And when we get down to the bottom of this first slide, this is pretty much when we started the distribution of this document. Because it's an EIS the distribution of this document was 2,500 copies or something along that. This takes us pretty much to where we are now. This is March 7th, this is just notifying this is an EIS feasibility study.

The last sheet here will take us to where we are now, to March 21st. And as I think Dennis has told you, April 20th is the date that we are asking for everybody's comments. You can give us some comments this evening if you'd like to, written or verbal comments. And I think the last chapter in the proposed plan, there's -- also you can send it, there's the address for submitting your comments to the US DOE, Ken or Gary, or you can send them out to Jim Saric.

What we're going to do at that point in time is prepere a responsiveness study. When we submit our Record of Decision down here on June 10th to US EPA, that Responsiveness Summary will be part of that document. So that's your opportunity to see how we responded to your comments.

This last one down here, there's been quite a few questions on what kind of public involvement do we have from this point on. Now, they have revised the Community Relation Plan in 1986 and 1989. And it takes us pretty much up to the Record of Decision point; is that right, Gary?

MR. NIXON: That's right.

MS. ALLEN: So what we need to do, in the next three months I think the Public Relations Department will be sending out some questionnaires and folders to members of the community to get some communication, when we get into remedial design what part do you want to play, how involved do you want to be to, do you want to continue to have round tables.

We need to get some communication and revise that plan. I think this is a pretty standard format for all of the operable units once they get to the feasibility study point as we go through the round tables and have a public meeting.

At this time what I would like to do is

ask Jim Saric from US EPA and Tom Schneider from the Ohio EPA if they'd like to make some comments.

MR. SARIC: I guess when I look at the meeting we're having here tonight, the proposed plan for Operable Unlt 4 silos, I kind of sat back and started thinking about some of the first times I was involved in this project in 1987 for a few months. And then I went and was working for EPA on another Department of Energy project and came back several years ago in '91, and the K-65 silos were an issue of a very heated debate. They were a very strong public concern.

I think if it was the one symbol of the Fernald site that was representative, it was the K-65 silos, and a very significant source of contamination, a very significant source of concern for all of us involved.

And I think today we're really at a key pivotal point, a crossroad, where DOE is proposing a remedy, one which we've looked at and reviewed several times as well as Ohio EPA. And we've looked at various options, and we think we've got one that's very reliable, a very good option for handling this material.

And, you know, we're hopefully going to be able to move forward. We're encouraging you to come forward with comments on this thing, and then you'll have the Record of Decision coming in in June which will basically begin finalizing this decision. Obviously, if you look at some of the earlier slides, there's still a lot more work to be going on.

I mean, this is a decision on what we're going to do, and now it's actually let's go out and do it, remove the silo waste or whatever the action. This will continue, and there's a lot of work to be done, and I think the dates in 2,000 are, you know, ongoing as far as when activities will be completed in 2,000 or 2,002.

So I guess, personally, I think we're at a big crossroad here, and I guess it's important really to understand what action is being taken, and I encourage all your comments to give. If you've got any questions, please ask any of us, myself or Tom Schneider, and we can go over those things with you. Thanks.

MR. MITCHELL: At the last meeting I showed a new table of organization for the new officers for the facility over the site, and Tom Schneider has been selected as the Fernald Coordinator, and this is his first meeting.

MR. SCHNEIDER: Well, I just want to reiterate what Jim said. I think he said it very clearly. We're at a very significant point in the process. You know, we've all came a long way, and you're all to be congratulated for having stuck it out so long.

We're finally at the decision point. We've spent all this time investigating this site, now we're asking the decision. Now is not the time to give up on your involvement, and now is probably the time to make your comments count the most. Your comments on this plan and the future proposed plans is really where you have a chance to make a substantial difference.

We along with US EPA participated in the review of these documents and the proposed remediation, but we're always open to your suggestions and comments. So like I said, we look forward to your coomments on this document. If you have questions, we'll be here to answer them.

In the future there will be probably

a few more of us from Ohio EPA. We're hiring some more staff, so hopefully that will be a little more proactive to your needs and help you out as far as information you might need. So like I said, feel free to contact me outside of this at the office or wherever. Thanks.

MR. STEGNER: Thank you. What we'll do now is, we'll have an informal question and answer session. It might be best if you use a microphone back there. If you don't feel comfortable, just stand up and shout it. We have a recorder here tonight. Please just state your name and the question, and we'll let the panel pick it up. So whoever wants to be first, feel free.

MS. NUNGESTER: I'm Norma Nungester. I'm a Fernald resident, and a member of Fresh. I have a question of Dennis Nixon. He made the statement that I don't agree with, and I wondered if he could clarify for me. He said that when you vitrify waste, it reduces radon emanation to that of building materials. To my understanding, when you vitrify radionuclides, that they still are very, very hot.

MR. NIXON: That's correct. The

concentrate, due that reduction, is the radon generation from the treated waste itself that is significantly reduce. The radon is actually held up, and the surface area is significantly reduced. Did you get every other word?

You're exactly right, that due to that fact that there's a significant volume reduction, you actually concentrate the radionuclides, so you have a higher concentration of say uraniun in a set volume, but the radon itself is much less. The generation or the emanation from the vitrified waste is much less than in its natural form.

MS. NUNGESTER: Okay, thank you.

MS. YOCUM: Edwa Yocum, Fresh member and a resident of the Fernald area. I was asking a question, this concerns Subunit C2 on your preferred alternative demolition removal on property disposal. When you were talking about the OU4 NEPA compliance with the substantive cumulative impact up to 250 acres of surface disturbance, does that mean that would be what would be part of where the waste will be put?

MR. WOODS: Yeah. Again, we looked

at an LRA and assumed on-site disposal.

MS. YOCUM: Okay.

MR. WOODS: And that acreage would incur areas where waste would be disposed of.

MS. YOCUM: Okay. Then, you also are talking about the loss of 220 acres of habitat. Is that included in the 250 acres?

MR. WOODS: Yeah. That 250 would be a total that would occur during the short term, in other words, during excavation activities. Once remediation is completed, we would look at approximately 220 acres being permanently committed, so yes, that's correct.

MS. YOCUM: Okay, all right, that's what I wanted to know.

MS. NUNGESTER: Can you expand on that permanently committed? I missed something. Permanently committed for what, waste disposal facility?

MR. WOODS: Yeah, correct.

MS. NUNGESTER: Not for the waste itself but for the --

MR. WOODS: For the facilities that would house the waste.

MS. NUNGESTER: That's the inground facility, the upgrade vault, as you so say?

MR. WOODS: Correct.

MS. NUNGESTER: Now can you give me an explanation of what is in an upgrade vault?

MR. WOODS: The alternatives that we used for the evaluation utilized the vault concept, which would be a portion of the waste being disposed of below grade, and, you know, basically a portion above. There would be facilities that the waste could be retrieved from, and what we used was the calculation of the area.

MS. NUNGESTER: Disposal means permanent?

MR. WOODS: Yes.

MS. NUNGESTER: But now you're talking interim?

MR. WOODS: Well, what I'm saying is the design of the facility wasn't as important as the area that the facility could include. Designs are going to be finalized as we go through the remedial process.

MS. NUNGESTER: Well, this is another thing, when you go through the RA and

that's where the final decision and designs are
actually made --

MR. WOODS: Correct.

MS. NUNGESTER: -- how can you come out with a Record of Decision before you actually know what the vault is going to look like and if it is really going to do the job?

MR. WOODS: No, you cannot reach a Record of Decision until, you know, we've gone through the full analysis of what the vault will be designed like and how it will work. What we did is utilize the alternatives that were available at that time for the purpose of the evaluation, which is really the best we can do. We can't foresee.

MS. NUNGESTER: Okay as of today?

MR. WOODS: That's correct, that's correct. As we go through the various operable units and decisions are made as to the final design of the vaults and changes are made to the area, that may be required. We'll update tbe analysis and provide it in the future integrated documents for the other operable units.

MS. NUNGESTER: Okay. So then our decisions of the -- So your alternatives for the

Unit 4 can change by the time after arriving at a decision?

MR. NIXON: We were specific with the subunit wastes the Record of Decision. For Operable Unit 4, specifically the Record of Decision, the proposed plan in the future Record of Decision will be that the Subunit C waste is -- you remember us talking about being held in abeyance or delayed operable units, the Subunit C waste will be handled in accordance with the Records of Decisions for Operable Unit 3 and Operable Unit 5, respectively. Okay.

So as far as our Record of Decision, essentially we carry it through the removal of the soil, interim storage of that soil in accordance with Removal Action 17, which is the management of those soils, demolition of the structures and storage of that debris in interim until OU3 comes up with a final decision for the debris.

OU5 will have a final decision on how the soils will be treated, and those all integrate very well. When we start that remediation process, when we have those soils excavated and stored, at that time Operable Unit 3 and 5 Records Of

Decisions will be in place, and we'll have very good integration.

At that point we'll be able to deliver -- Theoretically, we'll be able to take the soils out and take those to a Operable Unit 5 facility for treatment. They'll be disposed of in accordance with their Rccord of Decision, and that may or may not be on-site disposal.

MS. NUNGESTER: Okay. You're saying, you're taking the debris, the structure, the equipment, the surface soil, you're putting them all in the underground vaults?

MR. NIXON: Operable Unit 4 is delaying that decision. That's going to be actually be stored in an interim fashion --

MS. NUNGESTER: Okay

MR. NIXON: -- until OU5 and OU3 have records of decision. Now, their Record of Decision may very well be that we will treat soil by washing it and disposing of that on site.

MS. NUNGESTER: Right, but it doesn't say that, that it's going to be interim until Unit 5 is considered.

MR. NIXON: The proposed plan does

clearly state, as well as the Record of Decision will clearly state those, that integration.

MS. NUNGESTER: It does?

MR. NIXON: Yes, it does.

MS. NUNGESTER: Okay. Well, I know on the proposed plan booklet on page 43 talks about that specific issue.

MR. NIXON: Right.

MS. NUNGESTER: If anybody has that book, and they want to look at it, they can, but I don't believe it says -- It says something about that it will be combined with 5, Unit 5, but it does not say that would be interim disposal until 5.

MR. NIXON: Disposal, it is interim storage.

NS. NUNGESTER: Or storage, but they use "dispoeal" as the word throughout the whole --

MR. NIXON: In the proposed plan, the proposed plan has, for Subunit C waste, it has a selected or preferred alternative which is on-site disposal identified, and the reason that's in there is because on-site and off-site disposal was so close we had to select the one for the sake evaluating the full alternative from start to finish. Okay.

Later in the document it talks about the integration effort that will occur with OU3 and OU5, and puts -- holds that decision in abeyance for final disposal of those debris and soil until OU3 and OU5 have their Records of Decision.

MS. ALLEN: The confusion could be the fact sheet on page 12 states that the soil debris will be disposed of on site.

MR. NIXON: There is an error in the fact sheet on page 12, the last paragraph I believe.

MS. NUNGESTER: Then, this shows more of a reason why the public should have a comment period before -- after -- in between the ROD's and even during the remedial, the RA, then, to underatand it. Thank you.

MR. STEGNER: Other questions?

UNIDENTIFIED SPEAKER: I have one, and it goes to back to when you were talking about, Randi about, the community and stake holders or public or whatever we're called these days, plays a part in this process. I'll echo what Edwa just said. We give our comments, then there's a Record of Decision. You respond to our comments, and you follow this thing down.

But what if we don't like your responses, you know, I don't see another -- I guess as a stakeholder, which is kind of an okay word these days, I guess I have a little bit of a problem with that because once I give you my comments on this as of April 20th, I don't get to say nothing else, and if you don't like what you choose or I don't like the way you responded to my comments, you know, how am I going to be able to come beck and say I don't like this?

MS. ALLEN: Just like with any other primary document, we submit them to US EPA, and that same document also goes over to the PEIC, apd I'm assuming that the Record of Decision will be like any other document in that once it hits the PEIC, you guys are invited and welcome to comment on the docunent and provide comments over to Gary and Ken.

UNIDENTIFIED SPEAKER: And they would be considered as official comments? Because as I read this thing here, it doesn't indicate that at all.

MS. ALLEN: It also doesn't in the remedial investigation report, but if you can remember --

UNIDENTIFIED SPEAKER: I guess what we're asking for is that we need to be walked through this process, you know. Once the Record of Decision is made, we need to be talked to before your remedial design stuff. We need to be involved in that remedial design stuff.

Then we need to talk about the remedial action stuff, and it's going to create a lot of work for people, but we're afraid if we're not walked through that procese that we're going to end up at the end with an alternative that people in this community are really going to be upset with.

MS. ALLEN: I think that's where the input on the edition that's coming out of the public relations group is going to be critical because it doesn't take us past the point we are right now, and I think we need to get some kind of idea of what kind of part you guys want to play in that.

MR. PICKLES: Really the FS and proposed plans for Unit 5 is coming out, you do have a comment period. I assume from your comments about what we're doing in the -- are you satisfied with the issue; is that right?

UNIDENTIFIED SPEAKER: Well, I mean some of us might be. I can't speak for everyone in this room, but, you know, at the same time we're going to walk through this process of designing how we're going to do this, I want to know what's going on and what's happening so I can verbally say I don't like this or I like this or this isn't right or whatever.

You know, I don't want to say, yeah, yeah, I'm all for your alternative here, this sounds great, let's do it, and then you don't talk to me until the year 2,000, and I don't like what you did.

You know, I think, you know, if we're going to stick through this process as we've done for ten years, and I guese we'll do it for the next how many ever, we want to make sure that we're making good and tough decisions as we move along here so when we get done, we have a cohesive decision in this community that we can live with what is left here.

MR. STEGNER: I think it's safe to say that we'll be involving you throughout the whole entire process, walking you through the process, you and the Citizens Task Foree.

UNIDENTIFIED SPEAKER: We need to see that as being a real life thing. Somewhere on here it needs to be written in here we'll talk to the public, we'll seek public input, we'll whatever. That needs to be added in here somewhere because we don't see that in here right now.

MS. ALLEN: Well, we almost have to because I'm already getting asked questions right now that I can't answer until remedial design. As far as long term during final remediation, I don't have the answers right now. So I mean, this process going to have to continue through final clean-up because I just can't answer the questions right now.

UNIDENTIFIED SPEAKER: On February 1st the Ohio EPA issued a notice of deficiency and closure. Were those deficiencies ever corrected?

MR. Nixon: Which closure plan?

UNIDENTIFIED SPEAKER: On Unit 4, the one you juat gave us an elaborate presentation on.

MR. NIXON: I believe there might be some confusion there. Can the State of Ohio clear that up? RECRA Unit 4 Solid Waste Unit possibly, it is not this operable unit.

UNIDENTIFIED SPEAKER: Not this operable unit?

MR. SCHNEIDER: That's correct.

UNIDENTIFIED SPEAKER: So two different hazardous waste units on this facility?

MR. SCHNEIDER: This ten's a hazardous waste unit.

UNIDENTIFIED SPEAKER: Could we ask them to stand when they speak?

MR. SCHNEIDER: We're saying Operable Unit 4 is it not a hazardous operable waste unit, not Operable Unit 4. I don't know what exact letter you may have there, but we can talk about it. I think it's probably a RECRA unit.

UNIDENTIFIED SPEAKER: It was issued February 1st out of your office, 1994.

MR. SCHNIEDER: Must be a RECRA

unit, then.

UNIDENTIFIED SPEAKER: Okay. I'll discuss it with you.

UNIDENTIFIED SPEAKER: I'm Lou Bogart. I'm a resident of Ross. I have some technical questions. In looking at data tables for Operable Unit 4, one of the things that strikes me is that you always report uranium 254/236. Does that mean there's U-236 there? If so, I don't believe it because U-236 doesn't exist in nature.

Secondly, the ratio of U-234 to U-238 in many cases look very odd, odd in the sense that in nature and in this ore and in the raffinate the 234, 238 ratio ought to be very close to unit. For example, when in the table that you've given a handout, the Silo 1 number looks pretty wrong. The Silo 2 number is more acceptable.

And the reason I think that's important is because you're going to focus the clean-up levels on U-238. I don't quite know how you're going to do that without doing some very sophisticated isotopic analysis. But in any case those numbers don't look right, and you see that in many, many tables.

On the inorganic chemicals, is there somewhere in all the OU4 documentation a list of all of the inorganic constituents? For example, I note that in most of the recent documents you don't list gold. Now you can. There is about, about four times as much gold in this material as silver.

Just as a side light for my own amusement, I calculated this afternoon. There's about $2.3 million worth of gold in those two silos, and that may not be important, but what other elements are not reported which may have some impact on the processing of the material by vitrification?

For example, there should be a fair burden of rare earths, the whole lamprophyllite series should be in these ores, and I don't see any of that being reported. Anybody have an answer for that one?

MR. NIXON: Well, you had about five questions, so I'll start in the beginning. One was 235 to 236, those are analyzed and reported the same. You are correct. We don't feel there is any uranium-236 in the residues. It's a good point.

Whether the ratio between U-234 and U-238 is correct, I do not have the answer to that, but we can discuss that and get back with you within the next couple of days.

MR. BOGART: How about a complete list of --

MR. NIXON: Complete list, the remedial investigation did do a complete list of the organics, inorganics. Whether gold was evaluated, I'm not sure. I'm looking at my team.

MR. BOGART: You were supplied gold by TLCP.

MR. NIXON: But we also do a full HSL, Hazardous Substance List, which gold would not be part of. So I'm not sure whether gold was particularly reported in the RI.

MR. BOGART: How about rare earths?

MR. NIXON: I couldn't answer that, either. We've got a copy of the remedial investigation here. Whether these fellows can quickly find answers to those questions or again we can get back with you.

Amy Engler I know is sitting out here somewhere taking very good notes, and we'll respond to any of the questions which we don't have answers to tonight. We've committed to have answers back within 48 hours from this evening.

MR. BOGART: Well, I -- not so much for myself, but I think for the general public.

MR. NIXON: Any question that is raised even in the informal conference will be addressed in the responsiveness.

UNIDENTIFIED SPEAKER: Can we use that gold as collateral, can we use that? You said there's like $2 million worth of gold. Can we use that as collateral somehow?

MR. BOGART: It's going to cost 90 million bucks, maybe we can make it 88 million bucks. On page 21 or whatever this thing is called, the proposed plan, the spiral-bound thing, on page 12 about the middle of the page is an initiation of a discussion about risk.

And this is the area that concerns me the greatest, because although you point out that -- And I presume in all cases you're talking about fatal cancers because there are, of course, nonfatal cancers also. And that's not terribly clear in anything that's written.

Risk from exposure, the radiation naturally occurring in the environment is about 1 in 100 primarily from radon; however, incremental risks targeted by the upper end of EPA range means if all persons within a population of 10,000, 1 person might get cancer from the exposure, and cancer is expected from all other causes. I think the whole business of risk assessment needs to be put into some kind of context.

If you look at thc lateet NCRP guidance, 115 and I guess 116, you can talk about risk in terms of about 4 or 5 times 10 to the minus 10 and you do the hocus-pocus chemists like to do. And that turns out the average resident from natural radon, that risk becomes about one half times 10 to the minus 2 and the range is 0 to 90 years old. And when 90 years old, I guess cancer is the last thing I'm going to worry about.

But in any event, you make the statement that the normal cancer risk is about 10 to the minus 2, and then you proceed to march down the road of things that are 2 to 4 to 5 orders of magnitude smaller, and it's never put in context. And I think these documents need to discuss with are we paying for, and that becomes a real problem. I don't know how many people feel comfortable with a 10 to the minus 6 risk, and I'm not real sure that that's a fatal cancer risk.

There is a problem with the methodology of using the health effect summary table slope factor thing as opposed to methodology that's used by people who do the beer studies and the NCRP studies because we're talking about vast orders of magnitude differences.

Now, the last comment I guess, I'd like to see something in these documents that more clearly explains why the CERCLA process has elected to use such abominably small risk estimates.

My last comment perhaps goes to EPA back in 1986, was a bad year for me, EPA published a notice of intent that they were going to promulgate residual regulation standards. It is now 1994, and, to the best of my knowledge, residual radiation level standards have not been promulgated.

In 1993 in a GAO report to Congress somebody in EPA said that in March of 1994 they were going to finally publish residual radiation standards, not publish them, but they would take them to OMB, which would be the fist step in getting them published -- well, not the first step, but a key step in getting them published in the Federal Register.

March 1994 is now. My concern is, is there one part of EPA working on residual radiation level standards which may very well impact on the clean-up levels that are being talked about here for the clean-up of OU4?

MR. NIXON: Was there any response?

MR. SARCA: Yeah, I can answer that from my understanding. One of the people involved from the EPA perepective that works with me, he's been commenting that he's involved in working on some of those standards. Will they directly impact this investigation, I don't know. I don't think so. Hearing some of the numbers, I think they may even be moving towards the side of being equally as conservative, could be more conservative.

I don't know what the final will come out with. When they do come out of the numbers, they'll go to budget and move forward from there. I do know they are being worked on. One of the people from my office is doing that right now. I don't know the exact state.

UNIDENTIFIED SPEAKER: If memory serves, I think that the gold Lou was talking about was contained in the pitch blend or whatever it was that came over from Africa that the United States bought and dumped into the K-65 silos. I heard or read that souewhere. You might want to check that out.

MR. NIXON: It is in the K-65 material, yes.

MR. BOGART: It all came from one mine.

UNIDENTIFIED SPEAKER: The reason they took that pitch was they wanted to strike gold?

MR. BOGART: No, radium and gold.

UNIDENTIFIED SPEAKER: As far as I'm concerned, it can be vitrified.

MR. BOGART: The question was, what else is there?

UNIDENTIFIED SPEAKER: Okay. I just have another question. When you said they were filling the silos, especially 1 and 2, did they transport it through a pipe?

MR. PICKLES: Yes, ma'am.

UNIDENTIFIED SPEAKER: That's not what I recall. If my memory serves me correctly, some of that material may have been put in that way, but I remember the workers saying at different times that they also carted barrels out there from the silos.

MR. NIXON: Most of the material in Silos 1 and 2 were in a drum form that came from Melloncrock Chemical Works in St. Louis. Those drums were taken to the drum handling building between Silos 2 and 3. The drums were dumped and then mixed into a slurry with water and pumped into the silo and then allowed to settle. The water was decanted off into the decant sump tank, and then that water was used to reslurry additional material coming from off site.

The material -- The majority of the material, that was processed here on site, because we did process both at the Melloncrock Chemical Works as well as some of the material being processed here, K-65 asterial being processed at the site in our Refinery Plant 2 and 3.

That material as it was processed from the production area at Fernald, it was transported hydraulically in a slurry through that underground trench, through the pipe back to Silo 2. But the majority of the material was in drum form and reslurried at the silos.

UNIDENTIFIED SPEAKER: I think that should have been mentioned in your report there, you know. It says, from the way I read it, everything went through that pipe and everything, which it wasn't really.

MR. NIXON: I tried to talk to that point in showing that one areal shot where you can see all of the large numbers of drums that were being stored by the silos. That is the incoming material that was coming in from Melloncrock in St. Louis and then reslurried at the site.

MR. STEGNER: Thank you. Let's take our break now and reconvene for the formal comment period.

(A brief recess was taken.)

(All panel members except Mr. Stegner stepped down.)

MR. STEGNER: This is the beginning

of the formal comment section where your comments will be entered to the Responsiveness Summary in the Record of Decision. We will do this as we have some folks who have signed up to make commments. You do not have to sign up to make comments. You can have an open mike at the end. There's only about four or five folks here that indicated they wanted to make comments.

Again, you do not have to use this forum to make the official comments. You can submit comments on one of these cards and leave then here at the and of the meeting or you can submit comments to the Department of Energy at the Public Affairs office. We also ask before you leave, if you don't send, to fill out the evaluation forms we have sitting on all of the chairs.

The first person we have is Kevin Sorrel. I guess can Kevin's not here.

UNIDENTIFIED SPEAKER: There's some folks still out here in the hallway.

MR. STEGNER: You want to check out there.

UNIDENTIFIED SPEAKER: Not there.

MR. STEGNER: Is Lee Bolver still here?

UNIDENTIFIED SPEAKER: He left.

MR. STEGNER: Bob, do you have something to say?

UNIDENTIFIED SPEAKER: I'll turn it in later.

MR. STEGNER: Bob Gessel -- Godsel, I'm sorry? Going very well so far. Tom Wagner, Citizens Task Force? Okay. We have an open mike, folks, if anyone wants to make a comment.

MS. NUNGESTER: You want my address, too?

MR. STEGNER: Not necessary, as long as we have your name.

MS. NUNGESTER: Norma Nungester, Fernald resident and Fresh group. I have several comments. First of all, I want to cover again what was stated in the question and answer period. I think between the draft ROD and the final ROD we need a public comment official time, and you need to formalize this. On down here below you say the public involvement, public involvement, that means nothing to us. You need to formalize that.

And you also need more details on your RD/RA work plan. We want to know more details on transportation. We want to be notified when you're transporting this stuff and talk about the meterials that are actually in the K-65 when they're vitrified and when you start to ship them out to Nevada.

Also this stuff that stays on site, I'd like to know how they will be monitored, and for how long of a period they're going to be monitored. I guess I just want to express that we want a guarantee that real-time monitoring will be used.

Also a suggestion, how about covering those silos when you start working on them? I think this is one of the most important things you could do for the community. I think that's about it. I'm trying to read ny notes that are chicken scratch here.

Oh, one more thing. I'd like to be diligent on referring large quantities of waste from other sites. We don't want anything brought in here from other plants to vitrify with our material or to be put under the storage areas.

Thank you.

MR. STEGNER: Thank you, Norma. Edwa?

MS. YOCUM: Edwa Yocum. Some of this will sound repetitious, but I'm asking for a public comment period between the ROD's, the draft and final; and we need an official public comment period after the RA process. And also I'm asking for a public comment period between the beginning and completion of remediation. And then, too, when dismantling the K-65 silos and also the 3 and 4, I'd like to have a protective cover be used around the silos.

And as far as I read in there, that EPA would be reviewing the vault or the disposal sites every five years, I'd like to know the definition of "reviewing," and I would like continuous monitoring and maintenance of on-site disposal vaults or at least one time a year as long as they're on site. And also, who would be paying for this monitoring and maintenance? And this way I recommend a trust fund for monitoring and maintenance of the disposals.

MR. STEGNER: Thank you, Edwa. Open

microphone still, folks. Thank you all very much.

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MEETING CONCLUDED AT 8:45 P.M.

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C E R T I F I C A T E

I, LISA CONLEY, RPR, the undersigned, a notary public-court reporter, do hereby certify that at the time and place stated herein, I recorded in stenotypy and thereafter had transcribed with computer-aided transcription the within (65), sixty-five pages, and that the foregoing transcript of proceedings is a complete and accurate report of my said stenotypy notes.

MY COMMISSION EXPIRES: LISA CONLEY, RPR
JULY 28, 1994.   NOTARY PUBLIC-STATE OF OHIO

SUMMARY OF MEETING MINUTES
COMMUNITY ADVISORY BOARD FOR THE
NEVADA TEST SITE

DATE: May 11, 1994
TIME: 7:00 P.M. - 9:30 P.M.
PLACE: THE ALEXIS PARK RESORT
LAS VEGAS, NEVADA
SUBJECT: PROPOSED SHIPMENT OF FERNALD, OHIO LOW-LEVEL RADIOACTIVE WASTE TO THE NEVADA TEST SITE

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ATTENDEES:

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J.E. Evered, FERMCO
Sharon Faurer, DOE/HQ
Joe Fiore, DOE/NV
Wendy A. Griffin, DOE/NV
Patricia Herrin, REECO
Warren Hooper, FERMCO
Steve Housen, FERMCO
Allene Kitchen, DOE
Joe Kitchen, DOE/NV
David Lojek, DOE/FN

Darwin J. Morgan, DOE/NV
Dennis A. Nixon, FERMCO
Don Ofte, FERMCO
Layton O'Neill, DOE/NV
Brian Perkins, REECO
David Rast, DOE/FN
Myrle Rice, IT Corp.
Kevin Rohrer, IT Corp.
James Saric, USEPA/Region V
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REPORTED BY: Wendy J. Pullium, PAI
Transcriber

CALL TO ORDER:

The meeting was called to order at 6:10 p.m.

The purpose of the evening's meeting was for two presentations. The first presentation was furnished by representatives of the U.S. Department of Energy Fernald Field Office located in Cincinnati, Ohio. The second presentation was presented by the Waste Management Division, U.S. Department of Energy, Nevada Operations Office.

Each presentation was followed by a question and answer session from the NV/CAB and the public.

Joe Fiore announced that the state of Nevada had made a request in response to a draft Environmental Impact Statement issued by Fernald which described the activities which result in waste being transported to the Test Site, and the request involved extending the public comment period on that document for 60 days to give the Community Advisory Board of the Nevada Test Site Programs (NV/CAB) an opportunity to understand the situation better. In response to that, Fernald agreed to extend the comment period by 30 days. The original closing date for comments was April 20th; it is now May 20th. This meeting was being held in time for comments to be put together in the next nine days.

FERNALD'S PRESENTATION:

Dave Rast from the Fernald Field Office gave a summary on the proposal to transport and dispose of low-level radioactive waste at the Nevada Test Site's radioactive waste management site. The waste will be generated in the cleanup and environmental restoration of the DOE's closed uranium production facility near Fernald, Ohio. If the proposed and subsequent actions are implemented, approximately 300,000 cubic yards of radioactive waste will be disposed of at the NTS. Disposal activities would cover a period of approximately 30 years. Copies of the slides presented are attached.

QUESTIONS AND ANSWERS:

At this time, each Board member introduced him/herself and then proceeded with their individual questions and/or comments.

DENNIS BECHTEL: First I would like to thank you for sharing information about the site. I had the opportunity to visit Fernald several years ago as a member of the EMAC board. Could you possibly translate your numbers, your 300,000 cubic yards and your annual figures in numbers of shipments, and what they might mean?

DAVE RAST: We get approximately 18 cubic yards of waste on the average on a shipment. If I do the simple math and just divide it by 20, that is 15,000.

DENNIS BECHTEL: So that's potentially what? Three thousand trips a year, and you are looking at FY96 here? (No response given.)

JOANNE STOCKILL: What kind of shipments are you talking, rail or truck?

DAVE RAST: Truck. Currently the only mode of transportation we have off site is truck shipments. We have been looking at rail shipments. Currently, the rail at Fernald is light gauge rail and cannot support heavy shipments, and we have some local rail in the area that is in need of repair before I would attempt to effect any shipments by rail.

JOANNE STOCKILL: Is that true of the 600,000, you are going to put in commercial sites?

DAVE RAST: Yes.

DENNIS BECHTEL: Follow up on the question I had. When you plan your shipping campaign, what sort of coordination do you do with state and governments and particularly the state of Nevada? How do you handle that?

DAVE RAST: Currently, we haven't done any coordination from Fernald in emergency preparedness. DOE established a radiological response team and divides the contaminant into areas for response in a case of a transportation emergency. We also effect training for our shippers. We also have a designated route for which drivers are to transport shipments. They also have a designated call-in time; they have to report at least once every 24 hours. Many of the trucks are being equipped with satellite tracking equipment. The drivers also have all the emergency contact information in their transportation file within a packet and the bill of lading transportation documents.

DENNIS BECHTEL: Where would those designated routes be in Nevada? Would they be interstates?

DAVE RAST: Interstates where possible. You can't get to the Nevada Test Site via interstates. They usually come across 95 over 15, up 15 and back out 95.

DENNIS BECHTEL: So right through Las Vegas?

DAVE RAST: Yes, sir.

LATHIA MCDANIELS: Can you tell me what steps are implemented to insure that we don't accidently get mixed low-level waste shipped to us?

DAVE RASP: To insure that we don't get mixed waste transported to the Nevada Test Site, there is an extensive characterization and certification program established by the Nevada Field Office. That certification program is defined in their Waste Acceptance Criteria Document, NVO-325. We adhere to the conditions established in that document.

We perform a review of our waste on a waste stream by waste stream basis. We also maintain control of containers; maintain control of who has access to waste disposal facilities such as our dumpsters on site have locks on them. Only designated personal have the ability to put trash into a dumpster, or to put any kind of material into a waste container. We are implementing even tighter controls now on waste containers.

We do do sampling analysis of some materials, characterizing them under the RCRA regulations to check for hazardous constituents, to make sure they are not a mixed waste. We maintain those characterization files at the site. They have been reviewed by the representatives from the Nevada Field Office and also from the Nevada Department of Environmental Protection on some of our waste streams.

LATHIA MCDANIELS: But there is no outside agency that has the hands-on ability to review while you are doing it?

DAVE RAST: Before we are allowed to ship to Nevada Test Site, they review the characterization files for the waste streams. Before that waste stream is approved for acceptance, they review it.

LATHIA MCDANIELS: When you say "they," who?

DAVE RAST: Nevada DOE field office.

JOE FIORE: We adhere to a very rigorous waste acceptance process. That includes formal submittal of applications from waste generators. But to specifically answer your question, part of that process involves oversight by the State of Nevada, Division of Environmental Protection. So that's the independent non-DOE part of the thing.

PAUL LIEBENDORFER: I will say, we probably made a significant impact on all the waste that is shipped out here from--not just Fernald but the other places as well--on the level of quality of the waste.

LATHIA MCDANIELS: Are you satisfied (Paul Liebendorfer) that we are not and we will not be getting any mixed low-level waste?

PAUL LIEBENDORFER: Within the documents we have seen so far

LATHIA MCDANIELS: Outside of the documents; your personal feelings?

PAUL LIEBENDORFER: I think at this point in time, there has been nothing raised. Maybe I should take a step back. There was a shipment that came in a couple years ago of thorium waste that we had great concerns about because of what we perceived to be a lot of inadequate documentation to support the position. We went around for about eight or ten months on that.

I actually went back, and they did some resampling of some containers that were left there, and observed the days worth of sampling and the evaluation, and insisted on additional information to be presented to be included in the waste package to support their position. After conclusion of that particular round, we felt that they, at that point in time, did have the ability to demonstrate that those documents coming back in, that, thorium waste, were in fact, not a mixed waste. They have implemented a process that we don't look at every waste stream. We are able to audit any waste stream we request.

Obviously, we cannot go to every site and look at every package, so we have got to the point where DOE conducts an audit and we audit DOE.

RICHARD NOCILLA: I have been wondering if apart from the tradition of bringing your waste to the NTS, is there another disposal site?

DAVE RAST: We have disposed of waste at the Envirocare Facility in Utah and recently made some additional shipments to a facility. Currently, under the current DOE regulations, the Nevada Test Site is the assigned disposal site for Fernald. Now, we are working on petitions to get the exemptions to dispose of low-level waste at commercial disposal sites.

CHRIS BROWN: What kind of half lives do the various radionuclides that you mentioned have?

DAVE RAST: The primary radionuclides that we have on site are uranium and thorium. I think the uranium is ten million years and thorium is a billion.

CHRIS BROWN: And do you all make highly enriched or low enriched?

DAVE RAST: We only made low enriched uranium. We have some material that is for sale that is approximately 20-percent enrichment. We have limited quantities of that. Approximately, I think 50 pounds of the 20-percent enrichment material which is currently on the block for sale, and more than likely it will be sold.

The highest enrichment we typically dealt with was 1.25 percent, which is about half a percent over normal.

CHRIS BROWN: The relation of this process of choosing the NTS and being designated to the PEIS process, I am curious because it has up to six possible sites for low-level waste to be sent throughout the complex. I'm wondering if Fernald would give consideration to a site more proximate to it through the PEIS process?

DENNIS NIXON: I believe he is referring to potential sites that could be constructed in close proximity to the Fernald site, and we have essentially found that not to be implementable at this time and cost effective for the small quantity of waste.

CHRIS BROWN: Three hundred thousand cubic yards is not a small amount.

DENNIS NIXON: The proposed action is only 13,000 cubic yards. The 300,000 is the total volume for the site.

CHRIS BROWN: Well, out of all the numbers you threw out at us, which 13,000 cubic yards?

DAVE RAST: Operable Unit 4 residues is the proposed action right now.

CHRIS BROWN: So, are you going to tier following EIS's on each of the operable units, and if so when will we be seeing those?

DENNIS NIXON: This is the 13,000 for this action with Operable Unit 4, and we talked about reducing that to 6,000.

DAVE RAST: Each of the follow-up operable units has an accumulative effect. As you get to the decision point in each of the other operable units, they will tier that effect into environmental assessment for each of the operable units, and those will be coming out at the dates that you see the arrow pointed to at this time.

CHRIS BROWN: So, if your presentation talks about the accumulative impact, the answer, we are only dealing with 13,000, which really isn't relevant. We are dealing with the whole thing. These things are coming out one after the other in the space of a year here, except for Operable Unit 3 which is going to take a few more. We are basically talking about the whole volume, not just the 13,000.

JACK CRAIG: The document you have now is for Operable Unit 4. It is only making a decision on the 13,000 cubic yards. Like you said there will be follow-up documents that will also finalize the decision on the other operable units.

If, through this process, all the leading alternatives are selected, you will get a chance to look at each one of those individually. And, those will add up to 300,000 if the leading alternatives are selected, but you will get a chance to comment on each one of those as they come out. But this document you are looking at now is only making a decision on the 13,000 cubic yards.

The other number that leads up to the 300,000, you will be able to comment on that later through the submittal of the following-up documents.

JOHN WALKER: I haven't heard any discussion about the alternatives for on-site disposal. Even though it is not the preferred alternative, it is an alternative that you did examine. Would you like to discuss those alternatives? The alternatives for keeping it all at Fernald on site.

DENNIS NIXON: I think that what I'm addressing here is just the proposed action, which is again the 13,000 cubic yards which is Operable Unit 4. There are various reasons why. We evaluated a full range of options and alternatives for both on-site and off-site disposal, various treatment options, etc. We chose the NTS because it performed the best out of all the alternatives that we evaluated, and these are the reasons why the NTS was rated better over on-site disposal. Also there are some real show stoppers when it comes to on-site disposal with this waste whether it's hydrology which Dave has covered; the climate, we have a lot of rainfall compared to what we would get in the desert here; the demographics of the area, there is a large population in close proximity of the site; the land use scenario is an agricultural land use, so there is a greater possibility of intrusion on the waste that was disposed of on site.

These things are resolved at the NTS. It is an arid climate; there is a very low population; there is very low probability of future intrusion on the waste; it's probably not going to be farmed in the future; the hydrology, geology, all that is very favorable to disposal of this waste at NTS.

JOHN WALKER: But there are some doable engineering systems where you can keep the waste on site a long period of time; is that correct?

DENNIS NIXON: That is correct. However, it does not completely pass the threshold criteria which we look at in the evaluation of the alternative. For one, it does not comply with all applicable, relevant, and appropriate requirements which are essentially the regulations that are applied to our site.

JOHN WALKER: I just want to make the point that there are alternatives to the preferred action that just didn't seem discussed at all.

DENNIS NIXON: We fully evaluated on-site disposal. This is the list of alternatives we evaluated in the Feasibility Study. For the Silo 1 and 2 material, or K-65 material, we have to evaluate no action, which obviously is a good solution for this particular operable unit.

We evaluated on-property disposal with various treatments, stabilization options as well as off-site disposal here and the NTS. We have not identified another off-site disposal facility that was available to this waste stream.

For the Silo 3 contents, essentially the same alternatives were evaluated. Subunit C being the debris and soils on other structures, etc., was review and evaluated and that will be disposed of on site most probably assuming that the Operable Unit 5 waste is selected for on-site disposal.

KATHERINE YURACKO: Well, this is what I wanted to see, but now I want to know why are the only possibilities on site in Nevada?

DENNIS NIXON: Well, these are the alternatives. We listed and reviewed and evaluated a lot more alternatives than this, but not all alternatives passed the threshold criteria, which was to be protective and to be able to comply with all the applicable, relevant, and appropriate requirements such as disposal at another commercial site. We cannot identify a commercial site such as the Envirocare Site. We cannot meet their acceptance criteria.

DENNIS BECHTEL: How much does cost effectiveness enter into it?

DENNIS NIXON: Well, I don't want to say it's low on the totem pole, but it is certainly less important than the threshold criteria and being protective of the human health and the environment. It is also the most cost-effective alternative.

PAUL RICHITT: With respect to the on site, what is the alternate plan used for Fernald Site after you finish remediation?

DENNIS NIXON: We have a citizen's advisory board at Fernald that is determining that very issue. We have not determined what the final land use for Fernald is.

PAUL RICHITT: Because you vitrify the waste, you reduce volume, you are going to stabilize it so it can't migrate. You are going to bring it to the Test Site; the whole premise is to say the waste materials will be held and stable. If that is the case depending on what you are going to put the Fernald Site to, you may have the same benefit by leaving it on site and not have to worry about transportation where you may introduce additional problems. So, is your basis for decision made before you have an alternate-use determination on the Fernald Site?

DENNIS NIXON: We don't believe so. Again, on-site disposal does not pass the threshold criteria, and we cannot meet all the applicable, relevant, and appropriate areas. We cannot insure that we--in the long term over a thousand-year period--that we would not have intrusion due to the land use and the demographics of the area.

JOANNE STOCKILL: Is there any assurance there would not be intrusion at the Nevada Test Site in a thousand years?

DENNIS NIXON: No, there is not. However, it is less likely.

BILL VASCONI: Are there any questions to be addressed from the audience?

DON HENDRICKS: Several months ago EPA took the position to DOE that the K-65 waste as well as some other high-thorium waste should be classed as greater than Class C waste. If by definition, you take that at face value, that means you should not dispose of those wastes in near-surface repositories. This doesn't quite seem to go along with that.

I would also assume that because you have reduced the volume and you have upped the concentration, which makes it even more significant.

DENNIS NIXON: That is true. The vitrification reducing the volume makes a more dense waste form. It does concentrate the radionuclides. I would just say that this waste is not high-level waste. It is not transuranic waste. It's categorized as 11e(2) by-product material. Even though the EPA Region V has applied 40 CFR 191, which is the regulation which controls high-level and transuranic waste, that was felt to be that our waste was enough like--due to the long-lived content and long lived alpha emitters--like the radium and thorium and uranium series, that we should consider that in our decision for the waste stream, and which we did in the document.

CHRIS BROWN: In terms of projected disposition at varies places, some on site some commercial and some NTS, how does that work out in terms of radioactive hazardous materials, etc.

DENNIS NIXON: I think that all the waste that Dave spoke of was low-level radioactive waste.

DAVE RAST: All the waste that is projected in that is low-level radioactive.

CHRIS BROWN: The commercial stuff, is there any chance it will be sent to an incinerator?

DAVE RAST: Most of the material that we are looking at disposing of commercially is not amiable to incineration. It's soils, it's a sludge material out of our waste pits: it will need some drying. Most of the drying technique that we are looking at is either a (unintelligible) drier or we found compaction and super compaction is a much more effective drying technique than incineration. Incineration is very expensive. Any kind of thermal treatment chews up massive amounts of energy, and you can run a 5,000-ton press a lot more energy effectively than you can an incinerator.

JOANNE STOCKILL: I wanted to ask Joe, should this shipment go to the Test Site where would it be and how would it be stored? Would it be in Area 5?

JOE FIORE: Yes. It would be treated as low-level waste as it is defined by our current DOE Orders, and the bulk of it would go to Area 5 or Area 3 which is nearby.

KATHERINE YURACKO: I'm now confused as to what this stuff is we are talking about. Did you say this stuff was regulated under the 40 CFR 191?

DAVE RAST: No. 40 CFR 191 was applied as a relevant and appropriate regulation to be considered. It is not a high-level waste product. It is a by-product from a leaching operation. The US/EPA Region V felt that if we wanted to dispose of that material on site, in our management of that material, we would have to follow the 191 guidelines.

KATHERINE YURACKO: Knowing nothing more than EPA Region V, that sounds reasonable to me. How does the facility you're talking about putting it in at the Test Site compare with a 40 CFR 191 facility?

JOE FIORE: We have done some performance assessments, Kathy, consistent with both 40 CFR 191 and the DOE Order, and I think we have some preliminary results. I'm not certain I know them or I can explain them very well. Layton, do you know what the preliminary results are?

LAYTON O'NEILL: Yes. They showed that the situation that we have will satisfy the 40 CFR 191, and we need more data to affirm that.

JOE FIORE: Let me explain. The Order we are applying for our low-level waste disposal, the Order that we must meet is that for low-level radioactive waste performance assessments described in a DOE Order, but that is the prescriptive role to meet. The consideration of 40 CFR 191, I believe, is a more rigorous requirement and I think we are trying to demonstrate that we also meet that, but it is not a requirement that we do meet that for disposal of low-level waste.

KATHERINE YURACKO: But it sounds like the only reason it can't go is at Fernald is because they require that they comply with 40 CFR 191, and so it is coming here because there is no requirement in Nevada to comply with 40 CFR 191. Have I understood that right?

DENNIS NIXON: That is not entirely true. There is another regulation, an OAC (Ohio Administrative Code) regulation, which would prohibit tne location of a disposal cell over a sole source aquifer, which we would not comply with as well with this particular sighting of a disposal cell for this type of waste.

KATHERINE YURACKO: Let's say this is 40 CFR 191 waste. We have got 40 CFR 191 facilities all over this country. Can't we put this in one of them?

DENNIS NIXON: I'm not familiar with the locations of those facilities.

KATHERINE YURACKO: Well, there is this kind of waste elsewhere; right? Isn't this similar to mill tailing waste we have got all over the country?

DENNIS NIXON: No, I don't believe so.

KATHERINE YURACKO: It's originated under the same regulations.

DENNIS NIXON: Right.

KATHERINE YURACKO: We have facilities constructed around this country under this regulation. But you are saying that none of those can take this waste?

DENNIS NIXON: Right.

JOHN WALKER: I don't think there are any facilities under 191. I think WIPP is the only facility that they are looking at for 191. I think 191 was thrown out or set aside on Yucca Mountain. They are trying to fix a standard for Yucca Mountain, but 191 is only being applied to WIPP at this point, which is transuranic waste, which is long-lived much like uranium.

KATHERINE YURACKO: Then WIPP is an alternative for this?

JOHN WALKER: No.

KATHERINE YURACKO: I am not getting what this waste is.

DENNIS NIXON: I think this is a very important issue that we have discussed hundreds of times over the last two years. The reality of the matter is that this waste is not 40 CFR 191 waste even though the US/EPA Region V has told us to consider it as relevant and appropriate. The DOE does not agree with that position and has put forward a position paper that would identify that they do not concur with that position. However, the ARARs (Applicable, Relevant and Appropriate Requirements) that we are required to work on under CERCLA, they are addressed by the Agency. We cannot negotiate those. Those are not subject to any kind of negotiation. We do not consider this 191 waste. It is clearly not high level, it is clearly not transuranic, which is the intent of that regulation.

The reason why it was applied to this waste is because it has greater than 100 nanocuries per gram of long-lived alpha-emitting radionuclides like uranium, radium, and thorium series. Those are enough like what is governed in 40 CFR 191 for Region V to make it relevant and appropriate in their minds.

MICHAEL VERRILLI: I have some questions about containerization of the material. How is that done? Is the material containerized there and then placed at the Test Site in the containers, or is it removed and then placed in other containers? The current shipments.

DENNIS NIXON: It is all containerized at the Fernald Site. It is not removed from the container before it is disposed.

MICHAEL VERRILLI: What kind of health hazards would those pose in the event of a breach of a container on a public highway?

DENNIS NIXON: Not being a health physicist, I'm not going try to take a guess on the health hazards. Most of the material we ship and most of the material that is transported to the Nevada Test Site has material that has fixed contamination or it's a nonsmearable, nonreleasable contaminant.

MICHAEL VERRILLI: So it is a contaminant that you would have to have long exposure to be damaged?

DENNIS NIXON: Right. And uranium, itself, is not a high radiological risk.

MICHAEL VERRILLI: The disposal at the Test Site itself, is it buried, is it above ground?

DENNIS NIXON: It is shallow-land burial.

JERRY SIEREN: A private citizen. One of the major news services this morning reported, I think it was the Review Journal, that the State of Ohio has become the leading candidate to host a commercial low-level radioactive waste disposal site. And the reason they have become the leading candidate is because the state of Michigan has been thrown out of the Midwest States Compact, because it refused to host the low-level radioactive waste site, and Ohio is the next largest producer of low-level radioactive waste in that Compact. A representative from the State of Ohio Environmental Protection Agency was quoted in the newspaper article, stating that the site would be located in Southern Ohio farm country due to lack of political clout in that area.

That was just introductory. My question: Was this site that is being considered now be located in the state of Ohio and presumably deemed acceptable for low-level rad waste, was it considered for the OU4 waste? And if not, why not, and could it be considered for that rad waste?

DENNIS NIXON: We considered a regional disposal alternative. If you look at the OU4 documents, that was one of the unsighted low-level waste disposal cells within 300 miles of Fernald and was evaluated as an option. The current low-level waste repository for Ohio has gotten the honor to site within their state is part of the Compacts' low-level waste disposal sites under the Low-Level Waste Policy Act. And just by virtue of that Act and within the terms of that Act, DOE is prohibited from using those sites.

JERRY SIEREN: Is the site in Utah? Envirocare?

DENNIS NIXON: It's not a Compact site.

JERRY SIEREN: It does accept commercial low-level rad waste?

DENNIS NIXON: Yes, it does. But it's a private site.

A 10-minute break was called for after the Fernald segment and the group reconvened at 8:30 p.m.

WASTE MANAGEMENT DIVISION'S PRESENTATION:

Layton O'neill gave a slide presentation on the DOE Nevada Operations Office, Waste Management Division's current low-level radioactive waste management program. Photographs of Nevada Test Site Area 5 and Area 3 waste disposal facilities and practices, and subsurface monitoring wells and holes, were shown and described. Research results showing surface water does not seep below 20 feet down from the surface, and so does not travel down to the 800-foot deep water table, were described.

QUESTIONS AND ANSWERS:

KATHERINE YURACKO: First of all, I have a lot of questions, and I frankly don't think we are going to get through all of this tonight. I'd like to start off with one if I can. I heard that Ohio thinks this is 11e(2) material, and my comment earlier was DOE has lots of 11e(2) material, has lots of 11e(2) disposal sites around the country. Now, Layton was kind enough to direct our attention to Chapter IV of 5820.2A which addresses 11e(2) material, and I'd like to read--I was skimming that--and in Chapter IV, Section 3a(1), it states right here, "disposal sites should be identified and developed as needed in support of DOE remedial actions, and will normally be located in the state in which the wastes were generated." So, I still don't understand what's going on here.

LAYTON O'NEILL: Well, I will tell you what we did. When we started getting into this 11e(2) waste proposals to come to Nevada Test Site, we wrote a letter to Headquarters and said, provide us guidance because there is not enough in the document on that Chapter. So we are waiting to hear from Headquarters on further guidance on what they want us to do. That's all I can answer you. We don't have proper guidance from Headquarters on what to do with that material.

KATHERINE YURACKO: I guess one of the things I am still hung up on is this notion that the only two possibilities were on site and Nevada, and then it couldn't go on site because this was 11e(2) material, and so Nevada was the only alternative. But how about doing an evaluation of other 11e(2) disposal sites? 11e(2) is CFR 192. There are a number of facilities in this country that are regulated under the 40 CFR 192 that are taking DOE material, and so I'm just confused on this.

DENNIS NIXON: I'm not sure which sites you are particularly referring to. We have identified no other sites that could accept this material now. Not because it's 11 E2. Just being a low-level waste, it is not a mill tailing.

KATHERINE YURACKO: Well, that's what I'm confused about. I mean, I was told it's 11e(2), and now you are saying it's not really so, and it can't go into an 11e(2) facility. Have you done an examination? There are lots of those facilities. Let's take Grand Junction. Have you done an examination of putting this material in the Grand Junction facility?

DENNIS NIXON: No, we have not. However, Dave can address those other disposal sites.

DAVE RAST: Most of the other sites and everything for UMTRA disposal are for native North American mill tailings; and in particular, once you look at mill tailings that came off of those sites, and they were taken out and used throughout the country verses the leachate from the K-65 materials. In that process there is a higher concentration of radium in those products than we find within the UMTRA mill tailings. So, all the performance assessments done for the UMTRA disposal sites are not driven to the levels of the material that we have in the silos.

KATHERINE YURACKO: So this facility on the Nevada Test Site is more protective than a 40 CFR 192 facility?

DAVE RAST: Yes. Given the information of the performance of the cells that we have and we have looked at the NTS, yes.

DENNIS BECHTEL: I do have a general question for Layton. How did you happen to pick the sites? It seems like they are right on the boundary of the Test Site; Area 3 and Area 5, the low-level sites.

LAYTON O'NEILL: It was picked in 1953. It is fortuitous, according to my knowledge and information, about what happened to the NTS. They searched around in the United States for a number of years to find a place to test weapons, and they finally settled on the Nevada Test Site, and they said this is a good place to test weapons.

I understand about five years ago, or maybe ten, they reinitiated that investigation, and went out again and looked all over the United States to find out where the best place would be to test nuclear weapons, and they ended up with the Nevada Test Site again. Now, we were fortuitous in picking the location we did, because, it is a long ways to the ground table, and I think the early guys knew a little something about that. So, we just bought into that. As I told you, we knew something about the depth to water from the other wells.

Area 5 is 800 feet to the water table. And there are a couple of studies that were done right near to us, radiation migrations studies, that were done where we pumped water out of a well 100 feet from an original detonation, and we pumped on it for 14 years. And the first thing we saw was at the end of two years of continuous pumping day and night on that well, we saw tritium coming across, and we pumped on it again and the tritium got to its maximum concentration at five years, and then it started to decay away again.

The people that studied the ground water at NTS say that it moves something like 11 feet a year, and that's all it moves. We forced moving it by pumping down on it and keeping that pumping going for 14 years. So, it is absolutely a good place, and it's very dry underneath us.

In the Area 3 area, the water table is at 1300 or 1500 feet below the surface of the land. So, we think fortuitously they are both good locations, and we looked into that when we started Area 3. I told you we picked an area where the detonation was at least 500 feet above the ground water table, and so we know we have got 500 feet of basically unbothered soil beneath; if nothing else, it is probably compressed by the weapons tests.

BILL VASCONI: Realizing the site characteristic studies and the fact that it is bound to be a better place than along the Miami River back in Ohio, my question would be, you do have an ample supply of holes at the Test Site to have your dumps, and I'm sure it can get shipped here. Is there any benefit to be derived from the state of Nevada for bringing in the waste?

LAYTON O'NEILL: Well, I think that depends on who you talk to. For mixed waste, the state of Nevada was gaining $20 a ton for the cement blocks we were putting in the ground. That's pretty good business for the state of Nevada. They could also do that for other waste, I believe. They could charge a tariff on the DOE if they so chose to.

BILL VASCONI: Yes, accepting that it's a federal land and you are bringing in federal waste; is that not true?

LAYTON O'NEILL: Yes, sir.

BILL VASCONI: So the benefits to be derived for Nevada would be negotiating for the waste in tonnage and/or condition of; right?

LAYTON O'NEILL: I believe so, and we think that the waste is not going to get into the ground water table, so we think they are not going to be harmed any.

JOHN WALKER: Just on the question of money and benefits, it seems to me that DOE receives the disposal funds from its off-site generators. Isn't that the case that derives some of the waste management budget?

JOE FIORE: Yes. DOE takes out of the one pocket and puts it into another. We provide a budget for the generator site and as we receive it, they pay us so much per cubic foot. So overall, the DOE, the disposal of it, is funded by the Department.

LAYTON O'NEILL: Last year we had excess money and Reynolds Electrical and Engineering Company was forced to return two million dollars; I think it was, to Headquarters, because we had more money than we were suppose to spend. So it was returned to the Treasury.

JOE FIORE: And to the extent that those funds support workers at the Test Site and their jobs, that's the extent of the benefit to the economy of the state.

JOHN WALKER: It's a federal activity, clearly not a state activity.

JOE FIORE: Correct.

JOANNE STOCKILL: Many years ago there were discussions about the state charging a fee for use of Nevada roads and transportation. Has there been any recent discussions on that, for Nevada to gain some money from shipments that are going to the Test Site?

PAUL LIEBENDORFER: I can speak to recently. I believe it is Nye County that has looked into some of those situations. I would believe a separate tax to use the roads, within a road use, would be Department of Transportation, typical to any trucking activity that went over it. I do know a couple of counties that are actually looking at determining whether or not they could assess waste shipments that come back in to support county emergency response activities. And I do know one of the counties is actually looking at that to support their emergency response if something would happen on a road, but just a separate assessment that is specific to low-level waste or hazardous waste or something else, I don't think. Any interstate transport would have to be equal no matter what the material was.

LAYTON O'NEILL: I was involved, in my early days before I got into the waste management field, in the training. My bosses went to the speak to the Governor, and it was at the time we had been asked by Headquarters to start to receive off-site waste from the other locations in the United States. We made some concessions to the state of Nevada, and we promised to train every patrolman in response to radiological accidents and to provide them a radiation kit that was calibrated on a regular basis so they could depend on it. We never did provide them with instruments, but we made a deal with the state emergency management group to use civil defense instruments, and we calibrated them for about seven or ten years until the state asked us to cease that program of calibrating.

We still are training highway patrolmen at this time. We still are training fire fighters in the state of Nevada. We provided monitoring gear for the stop-stations for registering trucks coming in and out of the state of Nevada, and we set them up with a monitoring device and an alarm that would detect radiation if the truck had any that they weren't admitting or didn't know about. They were able to check and make sure they were within limits.

We were providing training for emergency medical people, and we are still doing that today underneath the waste management program. I'm paying REECo a yearly amount to go out and do this training. And we have trained most all of the fire fighters in the city of Las Vegas and all the cities that have fire departments; we train a few of the volunteer fire departments. We are doing these programs today underneath the waste management money.

JOE FIORE: I would just like to make a comment and maybe get an answer to a question to put this transportation thing in perspective. We did some back-of-the-envelope calculations that said 15,000 shipments over 30 years. That's 500 shipments a year. How does that relate to what we receive now? Don't we receive about 800 or a 1,000 a year today?

LAYTON O'NEILL: We are getting about three or four a week now. This isn't our heavy time now, because they are just getting out of the snow up there. So I guess, a couple hundred a year.

KATHERINE YURACKO: I have three concerns on this. One, is that from what I can tell, this appears to be inconsistent with the Departments' own policy on 11 e(2) material; two, I haven't been convinced that this is the only place that this material can go; and three, I'm concerned that Nevada gets nothing for this.

PROPOSAL NO. 1

At this point Katherine Yuracko proposed that the Board request a 30-day extension (for comments on the Draft EIS) in order to prepare an appropriate response, and in the meantime be provided with the Draft EIS and the four volumes of supporting documentation.

1. Dennis Bechtel concurred and requested that the Board ask for an extension.

2. Joe Fiore stated that this being the first procedural request that has been made by the Board, that he would abide by the consensus of the Board.

3. Jim Henderson also felt there was not enough information at the present time to make comments.

4. Bill Vasconi inquired if the Board's request for an extension would be adhered to by Fernald. In response, Jack Craig (a Fernald representative) said yes, they would.

5. DECISION: The Board voted on the proposal, and the proposal carried unanimously.

6. ACTION: Dennis Bechtel agreed to write a letter of request for a 30-day extension. The Board agreed that each Board member would need a copy of the summary DEIS, and the Board as a whole would request one copy of the four volumes of the supporting documentation therefrom.

7. The suggestion was made that the Feasibility Study and the EIS could be made available through Joe Fiore. There were four copies of the proposed plan, or summary document made available at the meeting through Fernald representatives. A request for any additional copies would need to go through Joe Fiore in order for Fernald to send them.

PROPOSAL NO. 2

Katherine Yuracko proposed that at future briefings, the Board needs to receive the summary documents in advance in order to review them before the presentation.

1. Bill Vasconi concurred with Kathy that the Board needed the summary information in advance.

2. ACTION: Joe Fiore recognized the need for the Board to be better informed in advance of any briefing or presentation and agreed to get information to the Board in advance at future briefings.

DISCUSSION ON THE CLASSIFICATION OF 11e(2)

1. Richard Nicolla asked for direction from DOE on why the proposed Fernald waste is classed as 11e(2) waste.

2. It was determined that Fernald asked DOE/NV to identify the proposed waste as 11E2. In turn DOE/NV requested Headquarters to give them policy and call back on it, because it wasn't clear to DOE/NV what it was.

3. Dennis Nixon made the point that in the DOE Orders, it refers to 11e(2) material being received at NTS in small quantities. The concern and question being can 6,000 cubic yards of the treated waste form be considered a small quantity? Thus leaving the question: What was the intent when "small quantities" was written in the DOE Orders?

4. The question was raised that there are other disposal facilities in the United States that can receive 11e(2) material. Why can't this waste go to these facilities?

5. ACTION: Joe Fiore agreed to pursue the intent of the words "small quantities" as written in the DOE Orders, but wanted to make sure everyone knew that it would take DOE longer than 30 days to get that answered.

6. ACTION: Fernald representatives agreed to respond and answer the question on why the other disposal facilities were not receiving this waste.

ANNOUNCEMENTS

1. Bill Vasconi announced that there was another CAB north of Las Vegas (SNFCAB). The SNFCAB is a cooperative agreement between Nye County and Lincoln County and Esmeralda County. They have elected a representative to attend and monitor this CAB's meetings for their benefit, and when appropriate this tri-county CAB would be prepared to give a presentation to this CAB on the group's activities.

2. Joe Fiore expressed his appreciation to the DOE and contractors representatives from Fernald for responding promptly to this Board's request for a presentation.

3. Joe Fiore also brought to everyone's attention that the Fernald representatives supplied copies of a public-information package which has their charter and fact sheets for each member of the Nevada CAB to review.

4. Dave Rast expressed the importance of follow-up in the formal documentation process in the comment resolution. The written portion of the process is very important.

Meeting adjourned at 9:50 p.m.

APPENDIX D

ADMINISTRATIVE RECORD FILE INDEX

Index Number	Document Number	Document Title	Document Date	From To	# of Pages	Type of Documents
U-006-101.27	DOE-750-92	THE ORIGIN OF K-65 MATERIAL BLEEKER PUBLISHING	01/27/1992	DOE	3	Letter
U-006-101.28	KLX-1222 4412	SUMMATION REPORT RECOVERY OF RADIUM FROM K-65 RESIDUE VITROCORP	02/12/1952	USAEC (DOE)	50	Report
U-006.101.29		PRELIMINARY ASSESSMENT OF ALTERNATIVES FOR PROCESSING AND DISPOSAL OF THE AFRIMENT RESIDUES	05/15/1981	BATTELLE DOE	59	Report
U-006-101.30		RESPONSE TO SPECIFIC REQUEST DURING HEARING BEFORE SUBCOMMITTEE ON ENERGY RESEARCH AND DEVELOPMENT	07/22/1987	DOE METZENBAUM	3	Letter
U-006-104.1	WMCO:EC:90-0204 1776	PRMIT TO INSTALL/PERMIT TO OPERATE DETERMINATION ON GLOVE BOX	06/14/1990	WMCO DOE-FMPC	2	L
U-006-104.2	DOE-1372-90 1777	PERMIT REQUIREMENTS FOR GLOVE BOX USE IN TREATABILITY TESTING FOR K-65 SILO RESIDUES	07/16/1990	DOE-FMPC WMCO		
U-006-104.4	DOE-23-91 2428	RESPONSE TO OEPA STIPULATIONS FOR INSTALLATION AND OPERATION OF THE GLOVE BOX FOR TREATABILITY TESTING	11/06/1991	DOE OEPA	2	Letter
U-006-104.10	2450	OEPA MAKES THE FOLLOWING STIPULATION REGARDING THE INSTALLATION AND OPERATION OF THE GLOVE BOX	09/27/1990	OEPA DOE	2	Letter
U-006-105.1	695	CALCULATION OF RADON EMISSION, DISPERSION,AND DOSIMETRY COLORADO STATE UNIV FROM K-65 STORAGE TANKS AT THE FEED MATERIALS PRODUCTION CENTER	10/01/1985	WMCO	14	Letter
U-006-105.2	786	K-65 SILOS STUDY & EVALUATION REPORT	02/25/1986	CAMARGO DOE	45	Report
U-006-105.3	3666	K-65 SILOS STUDY & EVALUATION CAMARGO REPORT APPENDIX A & B FEBRUARY 1986	02/01/1986	CAMARGO DOE	500	Report
U-006-105.4		K-65 SILOS STUDY & EVALUATION CAMARGO REPORT APPENDIX	02/01/1986	CAMARGO	500	Report

	3667	C, D & E FEBRUARY 1986				
Index Number	Document Number	Document Title	Document Date	From To	# of Pages	Type of Documents
U-006-105.5	3703	K-65 SILOS STUDY & EVALUATION CAMARGO REPORT APPENDIX F 1 OF 2 FEBRUARY 1986	02/01/1986	CAMARGO DOE	500	Report
U-006-105.6		K-65 SILOS STUDY & EVALUATION CAMARGO REPORT APPENDIX F 2 OF 2 FEBRUARY 1986	02/01/1986	CAMARGO DOE	500	Report
U-006-105.7	DE-AC05-81OR20722 167	STUDY AND EVALUATION OF K-65 SILOS FOR THE FEED MATERIALS PRODUCTION FACILITY AT FERNALD, OHIO	01/01/1990	BNI DOE-FMPC	50	Report
U-006-105.8	DE-AC05-81OR20722 168	APPENDICES A THROUGH H: STUDY AND EVALUATION OF K-65 SILOS FOR THE FMPC	01/01/1990	BNI	90	Report
U-006-105.9	DE-AC05-81OR20722 169	APPENDIX I: STUDY AND EVALUATION OF K-65 SILOS FOR THE FEED MATERIALS PRODUCTION CENTER AT FERNALD, OH	01/01/1990	BNI DOE	482	Report
U-006-105.10	FMPC/SUB-20A UC 555	A PROBABLISTIC RISK ASSESSMENT FOR THE K-65 SILOS AT THE FMPC, REVISION 1	10/01/990	UC DOE-FMPC	194	Report
U-006-105.11	2007	A PROBABLISTIC RISK ASSESSMENT FOR THE K-65 SILOS AT THE FMPC NOVEMBER 1990	11/01/1990	UC DOE-FMPC	100	Report
U-006-105.13	DOE-827-89 5619	K-65 SILOS STRUCTURAL ANALYSIS REPORT	03/28/1989	DOE-FMPC USEPA	2	Letter
U-006-105.14	5620	STUDY AND EVALUATION EFFECT OF INTERNAL ATTENUATION LAYER ON K-65 SILOS VOLUME 1 DECEMBER 1988 (A CAMARGO REPORT)	03/28/1989	DOE-FMPC USEPA	482	REPORT
U-006-105.15	5621	STUDY AND EVALUATION EFFECT OF INTERNAL ATTENUATION LAYER ON K-65 SILOS VOLUME II DECEMBER 1988 (A CAMARGO REPORT)	03/28/1989	DOE-FMPC USEPA	83	REPORT
U-006-105.16		STUDY AND EVALUATION EFFECT OF INTERNAL ATTENUATION LAYER ON K-65 SILOS VOLUME III DECEMBER 1988 (A CAMARGO REPORT)	03/28/1989	DOE-FMPC USEPA	752	REPORT

Index Number	Document Number	Document Title	Document Date	From To	# of Pages	Type of Documents
U-006-108.1	NEPA DOC. 19 4476	K-65 SILO CLOSED CIRCUIT TELEVISION (CCTV) MONITORING SYSTEM NEPA DOC. 19	05/19/1987	DOE DOE	9	Report
U-006-108.2	NEPA DOC. 38 4477	K-65 SILO RADON MITIGATION AND DOME REINFORCEMENT NEPA DOC NO. 38	09/14/1987	DOE DOE	18	Report
U-006-108.3	NEPA DOC. 118 4478	K-65 AND METAL OXIDE RESIDUE SAMPLING DOC NO. 118	08/10/1988	DOE DOE	17	Report
U-006-108.4	NEPA DOC 373 4480	CATEGORICAL EXCLUSION DETERMINATION K-65 EMERGENCY POWER SUPPLY NEPA DOC NO 373	03/03/1992	DOE DOE	3	Report
U-006-108.5	NEPA DOC 412 4482	CATEGORICAL EXCLUSION DETERMINATION OPERABLE UNIT 4 PILOT PLANT PHASE I NEPA DOC NO 412	04/12/1993	DOE DOE	5	Report
U-006-108.6	NEPA DOC. 451 5843	OPERABLE UNIT 4 PILOT PLANT PHASE II NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) DOCUMENT NO. 451	06/23/1994	DOE-FN FERMCO	5	LETTER/CATX
U-006-201.1	DOE-697-92 2821	ACTION MEMORANDUM: K-65 SILOS RADON TREATMENT SYSTEM	02/18/1992	DOE WEMCO	2	Letter
U-006-202.1	2822	REMOVAL SITE EVALUATION K-65 SILOS RADON TREATMENT SYSTEM	01/01/1992	DOE WEMCO	25	RSE
U-006-209.3	ORNL/TM-12185 4180	WASTE-SURFACE MAPPING OF THE FERNALD K-65 SILOS USING A STRUCTURED LIGHT MEASUREMENT SYSTEM	10/01/1992	ORNL DOE-FN	85	Report
U-006-301.1	PRE1256COV 91	SAMPLING AND ANALYSIS PLAN FOR STORAGE SILOS 1,2 AND 3 AT THE U.S. DEPARTMENT OF ENVERGY'S FMPC	04/01/1988	ASI WEMCO	215	Report
U-006-301.2	394	IMPLEMENTATION PLAN FOR THE K-65 AND METAL OXIDE RESIDUE SAMPLING PROJECT AT THE FMPC REV. 5	12/01/1988	WMCO DOE	532	Report
U-006-301.3	1693	RI/FS WORK PLAN ADDENDUM: OPERABLE UNIT 4 K-65 AND METAL OXIDES SILOS AND SUBSOILS SAMPLING AND ANALYSIS PLAN (WITH TREATABILITY PLAN) JANUARY 1990	01/17/1990		29	Addendum

Index Number	Document Number	Document Title	Document Date	From To	# of Pages	Type of Documents
U-006-301.4	DOE-745-90 270	TASK 9.33 K 65 SILO SAMPLING	05/08/1990	DOE ASI	1	Letter
U-006-301.5	829	SITE SPECIFIC HAZARD ASSESSMENT FOR BORINGS 2028 AND 2033 LOCATED IN THE K-65 CONTROL AREA MARCH 27, 1990	03/27/1990	ASI DOE-FMPC	40	Report
U-006-301.6	90L02298.HLW 276	K-65 SILO RE-SAMPLING OPERATING PROCEDURES	03/29/1990	ASI DOE-FMPC	52	Work Plan
U-006-301.7	DOE-1758-90 1276	K-65 SAMPLING PROJECT	08/24/1990	DOE-FMPC ASI	1	Letter
U-006-301.8	DOE-277-91 1831	K-65 SILOS SAMPLING AND ANALYSIS	11/15/1990	DOE-FSO USEPA	2	Letter
U-006-301.9	DOE-285-91 1995	REVISED K-65 SILO SUBSOILS SAMPLING AND ANALYSIS PLAN	11/16/1990	DOE-FSO USEPA	2	Letter
U-006-301.10	1996	RI/FS WORK PLAN ADDENDUM: K-65 SILO SUBSOILS SAMPLING AND ANALYSIS PLAN NOVEMBER 13, 1990	11/13/1990	DOE-FSO EPAs	14	Report
U-006-301.11	2430	RI/FS WORK PLAN ADDENDUM: K-65 SILO BERM VERTICAL BORING SAMPLING AND ANALYSIS PLAN WITH SITE SPECIFIC HEALTH AND SAFETY PLAN DECEMBER 1990	12/01/1990	DOE EPAs	50	Addendum
U-006-301.12	DOE-1151-91 1374	ADDITIONAL REVISIONS TO THE K-65 RESIUDE SAMPLING AND ANALYSIS PLAN	06/13/1991	DOE EPAs	12	Letter
U-006-301.13	1300	RESIDUE SAMPLING FOR K-65 SILOS SAMPLING AND ANALYSIS PLAN U.S. DEPARTMENT OF ENERGY FEED MATERIALS PRODUCTION CENTER FERNALD, OHIO MAY 28, 1991	05/28/1991	DOE EPAs	180	Report
U-006-301.14	DOE-1802-91 1865	REVISIONS TO K-65 SILOS SUBSOILS SAMPLING AND ANALYSIS PLAN	07/10/1991	DOE EPAs	2	Letter

Index Number	Document Number	Document Title	Document Date	From To	# of Pages	Type of Documents
U-006-301.15	1866	RI/FS WORK PLAN ADDENDUM K-65 SILO SUBSOILS AND PERCHED GROUNDWATER SAMPLING AND ANALYSIS PLAN JUNE 27, 1991	06/27/1991	DOE EPAs	30	ADDENDUM
U-006-301.16	DOE-1882-91 1744	REVISED SAMPLING AND ANALYSIS PLAN FOR THE K-65 SILOS RESIDUE SAMPLING PROJECT	07/25/1991	DOE EPAs	2	Letter
U-006-301.17	1745	RESIDUE SAMPLING FOR K-65 SILOS SAMPLING AND ANALYSIS PLAN JULY 15, 1991	07/15/1991	DOE EPAs	400	Report
U-006-301.18	WEMCO:ER:92-191 3016	K-65 SILOS DATA VALIDATION AND CHARACTERIZATION	03/17/1992	WEMCO DOE	2	Letter
U-006-301.19	DOE-244-91 5196	REVISED K-65 RESIDUE SAMPLING PROCEDURES	11/09/1990	DOE-FSO USEPA	2	LETTER
U-006-301.20	5197	K-65 SILOS SAMPLING AND ANALYSIS PLAN ADDENDUM TO THE FMPC RI/FS WORK PLAN	11/09/1990	DOE-FSO USEPA	204	ADDENDUM
U-006-301.21	WMCO:R:AEC:90-0032 5345	OPERATIONAL SAFETY REQUIREMENTS FOR THE SAMPLING AND ANALYSIS OF THE MATERIALS IN K-65 SILOS 1 AND 2	09/05/1990	DOE-FMPC	35	REPORT
U-006-301.22	DOE-1519-90 5816	K-65 SAMPLING PROCEDURES	07/25/1990	DOE-FN EPAs	179	PROCEDURES
U-006-302.1	DOE-1315-90 1008	OPERABLE UNIT 4 SAMPLING RESULTS	06/29/1990	DOE OEPA	17	Letter
U-006-302.2	344	TRANSMITTAL OF ANALYTICAL DATA	05/18/1990	ASI DOE	173	Data
U-006-302.3	246	CERTIFICATE OF ANALYSIS - PROJECT NUMBER 482331 JOB NUMBER 303317.24.05.20 - SILO MATERIAL	03/22/1990	IT WMCO	33	Certificate
U-006-302.4	WEMCO:ER:92-191 3101	CHARACTERIZATION OF K-65 SILO CONTENTS	03/31/1992	WEMCO DOE	2	Letter

Index Number	Document Number	Document Title	Document Date	From To	# of Pages	Type of Documents
U-006-303.1	DOE-1892-91 1707	OPERABLE UNIT (OU) 4 TREATABILITY STUDY WORK PLAN	07/23/1991	DOE EPAs	2	Letter
U-006-303.2	1718	TREATABILITY STUDY WORK PLAN FOR OPERABLE UNIT 4 TASK 5 WORK PLAN JULY 1991	07/01/1991	DOE EPAs	167	Work Plan
U-006-303.3	DOE-017-92 2246	OPERABLE UNIT 4 TREATABILITY WORK PLAN	10/03/1991	DOE EPAs	2	Letter
U-006-303.4	2247	TREATABILITY STUDY WORK PLAN FOR OPERABLE UNIT 4 OCTOBER 1991	10/01/1991	DOE EPAs	251	Report
U-006-303.5	2311	ADDENDUM TO OPERABLE UNIT 4 TREATABILITY STUDY WORK PLAN OCTOBER 1991	11/01/1991	DOE EPAs	4	Addendum
U-006-303.6	2506	OPERABLE UNIT 4 TREATABILITY STUDY WORK PLAN FOR THE VITRIFICATION OF RESIDUES FROM SILOS 1, 2, AND 3 DRAFT NOVEMBER 1991	11/01/1991	DOE EPAs	70	Work Plan
U-006-303.7	DOE-605-92 2470	REVISED OPERABLE UNIT 4 TREATABILITY STUDY WORK PLAN FOR STABILIZATION AND CHEMICAL SEPERATION	01/02/1992	DOE EPAs	2	Letter
U-006-303.8	2471	TREATABILITY STUDY WORK PLAN FOR OPERABLE UNIT 4 JANUARY 1992	01/01/1992	DOE EPAs	250	Report
U-006-303.9	DOE-753-92 2711	REVISED OPERABLE UNIT 4 TREATABILITY WORK PLAN FOR VITRIFICATION	01/28/1992	DOE EPAs	2	Letter
U-006-303.10	2713	OPERABLE UNIT 4 TREATABILITY STUDY WORK PLAN FOR THE VITRIFICATION OF RESIDUES FROM SILOS 1, 2, AND 3 JANUARY 1992	01/01/1992	DOE EPAs	75	Work Plan
U-006-303.11	DOE-1017-92 2920	PROCEDURES FOR VITRIFICATION OF OPERABLE UNIT (OU) 4 WASTE	03/05/1992	DOE EPAs	2	Letter

Index Number	Document Number	Document Title	Document Date	From To	# of Pages	Type of Documents
U-006-303.12	2921	PROCEDURES FOR THE OPERABLE UNIT 4 TREATABILITY STUDY WORK PLAN FOR THE VITRIFICATION OF RESIDUES FROM SILOS 1, 2, AND 3	03/05/1992	DOE EPAs	50	Work Plan
U-006-303.13	DOE-1174-92 3003	REVISED OPERABLE UNIT 4 VITRIFICATION TREATABILITY STUDY WORK PLAN	03/24/1992	DOE EPAs	2	Letter
U-006-303.14	3006	OPERABLE UNIT 4 TREATABILITY STUDY WORK PLAN FOR THE VITRIFICATION OF RESIDUES FROM SILOS 1, 2, AND 3 MARCH 1992	03/01/1992	DOE EPAs	145	Work Plan
U-006-303.15	DOE-1352-92 3088	DOCUMENT CHANGE REQUESTS (DCRS) FOR OPERABLE UNIT 4 TREATABILITY WORK PLAN FOR STABILIZATION AND CHEMICAL EXTRACTION	04/13/1992	DOE EPAs	2	Letter
U-006-303.16	3161	OPERABLE UNIT 4 TREATABILITY STUDY WORK PLAN FOR THE VITRIFICATION OF RESIDUES FROM SILOS 1, 2, AND 3 APPENDIX D PROCEDURES AND METHODS REVISED APRIL 1992	04/24/1992	DOE EPAs	40	Work Plan
U-006-303.17	DOE-0069-93 3804	DOCUMENT CHANGE REQUEST (DCR) FOR OPERABLE UNTI 4 TREATABILITY WORK PLAN FOR STABILIZATION AND CHEMICAL EXTRACTION	10/08/1992	DOE EPAs	6	Letter
U-006-303.18	DOE-0156-93 4098	DOCUMENT CHANGE REQUEST (DCR) FOR OPERABLE UNIT 1 AND OPERABLE UNIT 4 TREATABILITY STUDY WORK PLANS FOR CEMENTATION (OU4)	10/20/1992	DOE-FN EPAs	7	Letter
U-006-303.19	DOE-118-91 2026	REVISED PLAN FOR THE TREATABILITY SCREENING ACTIVITIES FOR OPERABLE UNIT 4	10/22/1990	DOE-FSO EPAs	2	Letter
U-006-303.20	2027	TREATABILITY WORK PLAN (LABORATORY SCREENING) FOR SILOS 1 AND 2 SEPTEMBER 1990	09/01/1990		66	Report
U-006-303.21	1433	SITE SPECIFIC SAFETY PLAN FOR THE K-65 VERTCIAL BORING OPERATIONS	03/01/1991		67	Report

Index Number	Document Number	Document Title	Document Date	From To	# of Pages	Type of Documents
U-006-303.22	5233	OPERABLE UNIT 4 REMEDIAL ACTION SAFETY ASSESSMENT REVISION O FEBRUARY 1993	02/01/1993	DOE-FN	65	REPORT
U-006-303.23	DOE-1009-94 5212	OPERABLE UNIT 4 PILOT PLANT PHASE I TREATABILITY STUDY WORK PLAN	02/25/1994	DOE-FN EPAs	2	LETTER
U-006-303.24	WP-18-0007 5213	OPERABLE UNIT 4 PILOT PLANT PHASE I TREATABILITY STUDY WORK PLAN REVISION O FEBRUARY 1994	02/25/1994	DOE-FN EPAs	123	WORK PLAN
U-006-303.25	DOE-400-89 5564	K-65 SILOS NEAR-TERM ACTIVITIES AND FINAL REMEDIATION PLAN	01/10/1989	DOE-ORO OEPA	8	WORK PLAN
U-006-303.26	DOE-712-89 5618	K-65 SILOS INTERIM STABILIZATION - SAND FILL (K-65 SILO PROJECT OUTLINE LAYER INSTALLATION) (WORK PLAN FOR THE K-65 STORAGE SILOS INTERIM STABILIZATION PROJECT - INSTALLATION OF SAND LAYER)	03/10/1989	DOE-FMPC USEPA	68	REPORT
U-006-303.27	DOE-1009-94 5850	OPERABLE UNIT 4 PILOT PLANT PHASE I TREATABILITY STUDY WORK PLAN	02/25/1994	DOE-FN EPAs	2	LETTER
U-006-303.28	WP-18-0007 5845	OPERABLE UNIT 4 PILOT PLANT PHASE I TREATABILITY STUDY PLAN WORK PLAN REVISION O FEBRUARY 1994	02/01/1994	USEPA DOE-FN	100	TS WORK
U-006-303.29	DOE-1675-94 5836	OPERABLE UNIT 4 PILOT PLANT PHASE II TREATABILITY STUDY WORK PLAN	05/11/1994	DOE-FN EPAs	2	LETTER
U-006-303.30	5838	OPERABLE UNIT 4 PILOT PLANT PHASE II TREATABILITY STUDY WORK PLAN FEMP **DRAFT** MAY 1994	05/11/1994	DOE-FN EPAs	156	WORK PLAN
U-006-303.31	5832	OPERABLE UNIT 4 PILOT PLANT PHASE II TREATABILITY STUDY PLAN WORK PLAN **DRAFT FINAL** AUGUST 1994	08/04/1994	DOE-FN EPAs	162	TS WORK
U-006-304.1	DOE-1763-90 1274	TRANSMITTAL OF THE REMEDIAL INVESTIGATION REPORT FOR OPERABLE UNIT 4 - FMPC	08/20/1990	DOE-FN DOE-HQ	1	Memorandum

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U-006-304.3	FMPC-0406-4 510	REMEDIAL INVESTIGATION REPORT FOR OPERABLE UNIT 4 TASK 6 REPORT AUGUST 1990	08/20/1990	DOE EPAs	535	Report
U-006-304.4	DOE-215-91 583	OPERABLE UNIT 4 - REMEDIAL INVESTIGATION (RI) REPORT	11/06/1990	DOE USEPA	3	Letter
U-006-304.5	FMPC-0406-5 584	REMEDIAL INVESTIGATION REPORT FOR OPERABLE UNIT 4 TASK 6 REPORT OCTOBER 1990	10/29/1990	DOE EPAs	567	Report
U-006-304.6	DOE-1261-93 4258	EXPOSURE FACTORS USED IN THE REMEDIAL INVESTIGATION AND BASELINE RISK ASSESSMENT FOR OPERABLE UNIT 4	03/05/1993	DOE EPAs	10	Letter
U-006-304.7	DOE-1688-93 4301	OPERABLE UNIT 4 DRAFT REMEDIAL INVESTIGATION REPORT	04/16/1993	DOE EPAs	2	Letter
U-006-304.8	4290	REMEDIAL INVESTIGATION REPORT FOR OPERABLE UNIT 4 VOLUME 1 OF 3 APRIL 1993 DRAFT	04/16/1993	DOE EPAs	450	Report
U-006-304.9	4291	REMEDIAL INVESTIGATION REPORT FOR OPERABLE UNIT 4 VOLUME 2 OF 3 APRIL 1993 DRAFT	04/16/1993	DOE EPAs	500	Report
U-006-304.10	4292	REMEDIAL INVESTIGATION REPORT FOR OPERABLE UNIT 4 VOLUME 3 OF 3 APRIL 1993 DRAFT	04/16/1993	DOE EPAs	450	Report
U-006-304.11	4698	REMEDIAL INVESTIGATION REPORT FOR OPERABLE UNIT 4 VOLUME 1 OF 3 AUGUST 1993	08/20/1993	DOE-FN EPAs	600	Report
U-006-304.12	4699	REMEDIAL INVESTIGATION REPORT FOR OPERABLE UNIT 4 VOLUME 2 OF 3 AUGUST 1993	08/20/1993	DOE-FN EPAs	600	Report
U-006-304.13	4700	REMEDIAL INVESTIGATION REPORT FOR OPERABLE UNIT 4 VOLUME 3 OF 3 AUGUST 1993	08/20/1993	DOE-FN EPAs	600	Report

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U-006-304.15	4947	REMEDIAL INVESTIGATION REPORT FOR OPERABLE UNIT 4 FINAL VOLUME 1 OF 3 NOVEMBER 1993	11/02/1993	DOE-FN EPAs	550	REPORT
U-006-304.16	4948	REMEDIAL INVESTIGATION REPORT FOR OPERABLE UNIT 4 FINAL VOLUME 2 OF 3 NOVEMBER 1993	11/02/1993	DOE-FN EPAs	550	REPORT
U-006-304.17	4949	REMEDIAL INVESTIGATION REPORT FOR OPERABLE UNIT 4 FINAL VOLUME 3 OF 3 NOVEMBER 1993	11/02/1993	DOE-FN EPAs	550	REPORT
U-006-304.18	DOE-1282-94 5357	REVISIONS TO THE OPERABLE UNIT 4 REMEDIAL INVESTIGATION FINAL REPORT	03/18/1994	DOE-FN EPAs	22	LETTER
U-006-304.19	DOE-1724-94 5625	OPERABLE UNIT 4 FINAL REMEDIAL INVESTIGATION REPORT RESPONSES	05/20/1994	DOE-FN FERMCO	19	
U-006-305.1	2137	RI/FS WORK PLAN ADDENDUM TREATABILITY STUDY OPERABLE UNIT 4 U.S. DOE FERNALD OH6 890 008 976	09/06/1990	USEPA DOE-FN	6	Letter
U-006-305.2	2146	RI/FS WORK PLAN ADDENDUM TREATABILITY STUDY OPERABLE UNTI 4 U.S. DOE FERNALD	09/07/1990	USEPA DOE	3	Letter
U-006-305.3	1925	OU#4 RI DISAPPROVAL U.S. DOE - FERNALD OH6 890 008 976	09/27/1990	USEPA DOE-FSO	9	Letter
U-006-305.4	2457	RI - OU #4 SAMPLING U.S. DOE - FERNALD OH6 890 008 976	10/18/1990	USEPA DOE	2	Letter
U-006-305.5	1767	RI/RISK ASSESSMENT O.U. 4	10/02/1990	OEPA DOE	1	Letter
U-006-305.6	2147	OU#4 - TREATABILITY STUDY U.S. DOE - FERNALD OH6 890 008 976	11/21/1990	USEPA DOE-FSO	4	Letter

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U-006-305.8	2459	OU#4 RI DISPOSAL U.S. DOE - FERNALD OH6 890 008 976	12/07/1990	USEPA DOE	30	Letter
U-006-305.9	1817	REVISED RI-RISK ASSESSMENT O.U. 4	12/07/1990	OEPA DOE	1	Letter
U-006-305.10	1175	OU#4 RI DISPUTE U.S. DOE - FERNALD OH6 890 008 976	01/04/1991	USEPA DOE	1	Letter
U-006-305.11	1176	OU#4 RI DISPUTE U.S. DOE - FERNALD OH6 890 008 976	01/04/1991	USEPA DOE	2	Letter
U-006-305.12		DISPUTE OU #4 RI U.S. DOE - FERNALD OH6 890 008 976	01/10/1991	USEPA DOE	2	Letter
U-006-305.13	1204	OU#4 EPA RI DISPUTE U.S. DOE - FERNALD OH6 890 008 976	01/25/1991	USEPA DOE	2	Letter
U-006-305.14	1205	OU#4 EPA RI DISPUTE U.S. DOE - FERNALD OH6 890 006 976	01/30/1991	USEPA DOE	2	Letter
U-006-305.15	2390	OU#4 EPA RI DISPUTE U.S. DOE - FERNALD OH6 890 008 976	02/22/1991	USEPA DOE	2	Letter
U-006-305.16	2159	OHIO EPA COMMENTS CONCERNING: THE TREATABILITY STUDY WORK PLAN FOR OPERABLE UNIT 4	08/22/1991	OEPA DOE	7	Comment
U-006-305.17	2154	DISAPPROVAL OF TREATABILITY STUDY WORK PLAN FOR OU#4	09/03/1991	USEPA DOE-FSO	2	Letter
U-006-305.18	2340	U.S. EPA COMMENTS ON TREATABILITY STUDY WORK PLAN FOR ou4	10/01/1991	DOE-FSO EPAs	36	Response

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U-006-305.20	2844	ADDENDUM AND REVISED TREATABILITY STUDY WORK PLAN FOR OU #4	12/02/1991	USEPA DOE	1	Letter
U-006-305.21	2612	DISAPPROVAL OF THE OU #4 VITRIFICATION TREATABILITY STUDY WORK PLAN	12/24/1991	USEPA DOE	1	Letter
U-006-305.22 2589		OHIO EPA COMMENTS ON OU4 VITRIFICATION TREATABILITY STUDY WORK PLAN		OEPA DOE	1	Letter
U-006-305.23	2738	APPROVAL O.U. 4 TREABILITY WORK PLAN	01/27/1992	OEPA DOE	1	Letter
U-006-305.24	2923	OHIO EPA COMMENTS OU4 VITRIFICATION TREATABILITY STUDY WORK PLAN		OEPA DOE	2	Enclosure
U-006-305.25	2966	DISAPPROVAL OF THE REVISED OU #4 VITRIFICATION TREATABILITY STUDY WORK PLAN	03/15/1992	USEPA DOE	1	Letter
U-006-305.26	3097	CONDITIONAL APPROVAL OF THE SECOND REVISION OU #4 VITRIFICATION TREATABILITY STUDY WORK PLAN	04/01/1992	USEPA DOE	1	Letter
U-006-305.27	3264	OU4 VITRIFICATION STUDY CONDITIONAL APPROVAL	05/14/1992	OEPA DOE	1	Letter
U-006-305.28	3545	REVISED PROCEDURES FOR OU #4 VITRIFICATION TREATABILITY STUDY	06/22/1992	USEPA DOE	2	Letter
U-006-305.29	4211	DOCUMENT CHANGE REQUEST FOR OU4 VITRIFICATION TREATABILITY STUDY	03/05/1993	USEPA DOE-FN	1	Letter
U-006-305.30	4533	OHIO EPA COMMENTS ON THE OU4 RI REPORT	06/17/1993	OEPA DOE	26	Comment

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U-006-305.32	4752	DISAPPROVAL OF THE OU 4 REMEDIAL INVESTIGATION REPORT COMMENTS	06/23/1993	USEPA / DOE-FN	72	
U-006-305.33	4766	CONDITIONAL APPROVAL OF REVISED OPERABLE UNIT 4 REMEDIAL INVESTIGATION REPORT	09/22/1993	OEPA / DOE-FN	3	COMMENTS
U-006-305.34	4808	CONDITIONAL APPROVAL OF THE OU 4 REMEDIAL INVESTIGATION REPORT	10/06/1993	USEPA / DOE-FN	13	COMMENTS
U-006-305.35	4938	OHIO EPA APPROVAL OF THE FINAL OU 4 RI REPORT		OEPA / DOE-FN	1	LETTER
U-006-305.36	469	SILO SAMPLING U.S. DOE-FERNALD OH6 890 008 976	05/25/1989	OEPA / DOE	1	Letter
U-006-305.37	1049	SILO SAMPLING U.S. DOE-FERNALD OH6 890 008 976	05/25/1989	OEPA / DOE	1	Letter
U-006-305.38	1755	K-65 SAMPLING	07/26/1990	OEPA / DOE	1	Letter
U-006-305.39	1277	K-65 SAMPLING OU#4 U.S. DOE-FERNALD OH6 890 008 976	08/15/1990	USEPA / DOE	8	Letter
U-006-305.40	2460	OU#4 EXTERNAL SAMPLING U.S. DOE FERNALD OH6 890 008 976	12/13/1990	USEPA / DOE	2	Letter
U-006-305.41	3345	FURTHER CLARIFICATION RELATIVE TO DISPOSAL OF THE K-65 RESIDUES AT THE FMPC	01/10/1991	USEPA / USEPA	5	Memorandum
U-006-305.42	1816	CONDITIONAL APPROVAL K-65 SIL VERTICAL BORING SAMPLING PLAN	02/07/1991	OEPA / DOE	2	Letter

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U-006-305.44	2121	APPROVAL OF K-65 SILO CONTENT SAMPLING PLAN	09/10/1991	USEPA DOE	2	Letter
U-006-305.45	5051	CONDITIONAL APPROVAL OF THE OU 4 REMEDIAL INVESTIGATION FINAL REPORT	01/06/1994	USEPA DOE-FN	6	COMMENTS
U-006-305.46	5566	WASTE ANALYSIS FOR SILOS U.S. DOE-FERNALD OH6 890 008 976	02/01/1989	USEPA DOE-FMPC	2	COMMENTS
U-006-305.47	5568	COMMENTS ON THE K-65 SILO SAND FILL PROJECT	05/19/1989	OEPA DOE-FMPC	12	COMMENTS
U-006-305.48	5567	K-65 SAND PROJECT U.S. DOE-FERNALD OH6 890 008 976	05/22/1989	USEPA DOE-FMPC	2	COMMENTS
U-006-305.49	5632	RISK ASSESSMENT COMMENTS ON CONDITIONALLY APPROVED OU 4 REMEDIAL INVESTIGATION FINAL REPORT	04/25/1994	USEPA DOE-FN	3	COMMENTS
U-006-305.50	5833	OPERABLE UNIT 4 PILOT PLANT PHASE I TREATABILITY STUDY WORK PLAN U.S. EPA COMMENTS	04/04/1919	USEPA DOE-FN	13	COMMENTS/LET
U-006-305.51	5834	OPERABLE UNIT 4 PILOT PLANT TREATABILITY WP -COMMENTS DOE FEMP MSL #531-0297	05/16/1919	OEPA DOE-FN	9	COMMENTS
U-006-305.52	MSL#531-0297 5844	OPERABLE UNIT 4 PILOT PLANT PHASE II TREATABILITY WORKPLAN OHIO EPA COMMENTS	06/27/1994	OEPA DOE-FN	5	COMMENTS/LET
U-006-305.53	5804	FINAL COMMENTS ON THE OU 4 REMEDIAL INVESTIGATION AND FEASIBILITY STUDY REPORTS	08/02/1994	USEPA DOE-FN	5	COMMENTS
U-006-306.1	DOE-40-91 1924	OPERABLE UNIT 4 - REMEDIAL INVESTIGATION (RI) REPORT	10/26/1990	DOE USEPA	2	Letter

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U-006-306.3	DOE-336-91 1843	OPERABLE UNIT 4 - RI/FS SCHEDULE	11/30/1990	DOE EPAs	2	Letter
U-006-306.4	DOE-429-91 1835	OPERABLE UNIT 4 - FEASIBILITY STUDY (FS) REPORT	12/13/1990	DOE-FSO USEPA	2	Letter
U-006-306.5	DOE-452-91 948	NOTICE OF DISPUTE - U.S. EPA DISAPPROVAL - OPERABLE UNIT 4 REMEDIAL INVESTIGATION (RI) REPORT AND U.S. EPA NOTICE OF VIOLATION (NOV)	12/20/1990	DOE USEPA	3	Enclosure
U-006-306.6	DOE-463-91 984	PHASE I TREATIBILITY STUDY FOR OPERABLE UNIT 4	12/20/1990	DOE USEPA	2	Letter
U-006-306.7	DOE-499-91 1174	SUPPLEMENT TO NOTICE OF DISPUTE - OPERABLE UNIT 4 REMEDIAL INVESTIGATION (RI) REPORT	12/26/1990	DOE USEPA	3	Letter
U-006-306.8	DOE-663-91 998	OPERABLE UNIT 4 - DISPUTE RESOULUTION	01/28/1991	DOE USEPA	3	Letter
U-006-306.9	DOE-748-91 1206	DISPUTE RESOLUTION - OPERABLE UNIT 4 REMEDIAL INVESTIGATION REPORT	02/13/1991	DOE USEPA	2	Letter
U-006-306.10	DOE-537-91 947	DISPUTE RESOLUTION - OPERABLE UNIT 4 REMEDIAL INVESTIGATION (RI) REPORT	01/07/1991	DOE USEPA	2	Letter
U-006-306.11	2252	RESPONSE TO COMMENTS TREATABILITY STUDY WORK PLAN FOR OPERABLE UNIT 4 JULY 1991 OCTOBER 1991	10/01/1991	DOE EPAs	50	Response
U-006-306.12	2472	RESPONSES TO COMMENTS RECEIVED ON THE OPERABLE UNIT 4 DRAFT TREATABILITY STUDY WORK PLAN DOCUMENT DATE - OCTOBER 1991 JANUARY 1992	01/01/1992	DOE EPAs	25	Response

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U-006-306.14	2883	RESPONSE TO THE OEPA COMMENTS OPERABLE UNIT 4 TREATABILITY STUDY WORK PLAN FOR THE VITRIFICATION OF THE RESIDUES FROM SILOS 1, 2, AND 3		DOE EPAs	9	Response
U-006-306.15		RESPONSE TO THE OHIO EPA COMMENTS OPERABLE UNIT 4 TREATABILITY STUDY WORL PLAN FOR THE VITRIFICATION OF THE RESIDUES FROM SILOS 1, 2, AND 3	03/24/1992	DOE EPAs	3	Response
U-006-306.16	3005	RESPONSE TO THE U.S. EPA COMMENTS OPERABLE UNIT 4 TREATABILITY STUDY WORK PLAN FOR THE VITRIFICATION OF THE RESIDUES FROM SILOS 1,2, AND 3	03/24/1992	DOE EPAs	3	Response
U-006-306.17	DOE-1434-92 3159	REVISED PROCEDURES FOR OPERABLE UNIT 4 (OU 4) VITRIFICATION TREATABILITY STUDY	04/24/1992	DOE EPAs	2	Letter
U-006-306.18	DOE-1773-92 3475	RESPONSES TO THE OPERABLE UNIT (OU) 4 VITRIFICATION STUDY CONDITIONAL APPROVAL	05/27/1992	DOE OEPA	6	Letter
U-006-306.19	DOE-2561-92 3693	REVISED PROCEDURES FOR OPERABLE UNIT 4 VITRIFICATION TREATABILITY STUDY	08/31/1992	DOE USEPA	3	Letter
U-006-306.20	DOE-2245-92 4097	REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS) - USE OF BLAST FURNACE SLAG IN OPERABLE UNITS 1 AND 4 FORMULATIONS	07/29/1992	DOE-FN EPAs	2	Letter
U-006-306.21	DOE-2416-93 4592	REQUEST FOR EXTENSION FOR RESUBMITTAL OF THE OPERABLE UNIT 4 REMEDIAL INVESTIGATION REPORT	07/13/1993	DOE-FN EPAs	2	Letter
U-006-306.22	DOE-2594-93 4658	OPERABLE UNIT 4 REMEDIAL INVESTIGATION REPORT - DRAFT COMMENT RESPONSE DOCUMENT	07/29 1993	DOE-FN EPAs	142	Response
U-006-306.23	DOE-2789-93 4697	OPERABLE UNIT 4 DRAFT FINAL REMEDIAL INVESTIGATION/BASELINE RISK ASSESSMENT REPORT	08/20/1993	DOE-FN EPAs	52	Response

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U-006-306.25 4945		RESPONSES TO USEPA AND OHIO EPA COMMENTS ON THE REMEDIAL INVESTIGATION REPORT FOR OPERABLE UNIT 4, AUGUST 1993	11/02/1993	DOE-FN EPAs	23	RESPONSES
U-006-306.26	DOE-873-89 3358	NOTIFICATION OF SAMPLING OF K-65 SILOS AT THE U.S. DOE FMPC	04/06/1989	DOE SOAPCA	2	Letter
U-006-306.27	1997	COMMENT RESPONSE TO U.S. EPA COMMENTS ON: THE RI/FS WORK PLAN ADDENDUM: K-65 SILO EMBANKMENT AND SUBSOILS SAMPLING AND ANALYSIS PLAN JULY 1990	07/01/1990	DOE EPAs	8	Response
U-006-306.28	DOE-1711-90 1275	K-65 SAMPLING PROCEDURES	08/10/1990	DOE USEPA	4	Letter
U-006-306.29	DOE-1722-90 1805	INFORMATION SUBMITTAL UNDER PARAGRAPH XIII (B) OF THE 1990 CERCLA CONSENT AGREEMENT - GLOVE BOX TREATABILITY TESTING	08/14/1990	DOE EPAs	4	Letter
U-006-306.30	2028	FMPC RI/FS REPORT OPERABLE UNIT 4 LABORATORY SCREENING WORK PLAN	09/01/1990	DOE EPAs	11	Comment
U-006-306.31	DOE-1937-90 1921	K-65 RESIDUE SAMPLING - RESOURCE TO U.S. EPA COMMENTS ON SAMPLING PROCEDURES	09/19/1990	DOE USEPA	2	Letter
U-006-306.32	2426	FMPC RI/FS PROJECT K-65 SILOS SAMPLING AND ANALYSIS PLAN RESPONSE TO OEPA COMMENTS	10/02/1990	DOE OEPA	2	Response
U-006-306.33	DOE-60-91 1842	K-65 SAMPLING	10/11/1990	DOE USEPA	2	Letter
U-006-306.34	DOE-413-91 911	INFORMATION SUBMITTAL UNDER PARAGRAPH XIII (B) OF THE 1990 CONSENT AGREEMENT - ORGANIC EXTRACTION - K-65 SILO RESIDUE SAMPLE ANALYSES	12/11/1990	DOE EPAs	3	Letter

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U-006-306.35	1157	RESPONSES TO OEPA COMMENTS ON THE K-65 SILO BERM VERTICAL BORING SAMPLING PLAN	01/01/1991	DOE OEPA	2	Response
U-006-306.37	DOE-1803-91 1874	K-65 CONTENTS RESAMPLING	07/10/1991	DOE EPAs	2	Letter
U-006-306.38	DOE-1886-91 1871	K-65 SLANT BORING #2	07/24/1991	DOE EPAs	2	Letter
U-006-306.39	DOE-2195-91 2069	COMPLETION OF OPERABLE UNIT 4 SAMPLING ACTIVITIES	09/10/1991	DOE EPAs	2	Letter
U-006-306.40	3344	REQUESTING A MEETING CONCERNING THE APPLICATION OF EPA STANDARDS FOR THE MANAGEMENT AND DISPOSAL OF HIGH-LEVEL AND TRANSURANIC NUCLEAR WASTE	03/23/1992	DOE-HQ USEPA	3	Letter
U-006-306.41	DOE-82-89 5338	K-65 AND METAL OXIDE SILO SAMPLING SCHEDULE	11/10/1988	DOE-FMPC USEPA	1	LETTER
U-006-306.42	DOE-1364-89 5469	STORAGE OF K-65 AND METAL OXIDE SAMPLE MATERIAL	08/30/1989	DOE-FMPC USEPA	1	LETTER
U-006-306.43	DOE-1806-91 5442	CONFIRMATION OF VERBAL APPROVAL PROCEED ON CONTENT RESAMPLING	07/12/1991	DOE-FSO EPAs	2	LETTER
U-006-306.44	DOE-067-92 5350	OPERABLE UNIT 4 TREATABILITY WORK PLAN ADDENDUM	10/08/1991	DOE-FN EPAs	2	LETTER
U-006-306.45	DOE-291-89 5563	RESPONSES TO USEPA COMMENTS ON K-65 AND METAL OXIDE SILO SAMPLING PLAN	12/23/1988	DOE-ORO USEPA	11	RESPONSES
U-006-306.46	DOE-1308-89 5565	RESPONSE TO U.S. AND OHIO EPA QUESTIONS ON K-65 SILO INTERIM REMEDIATION	07/14/1989	DOE-FMPC USEPA	33	RESPONSES

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U-006-306.48	5837	TECHNICAL REVIEW COMMENTS ON OPERABLE UNIT 4 (OU4) PILOT PLANT PHASE I TREATABILITY STUDY WORK PLAN, REVISION O GENERAL COMMENTS	05/11/1994	DOE-FN EPAs	12	COMMENTS
U-006-306.49	DOE-1837-94 5842	RESPONSES TO COMMENTS FROM THE OHIO EPA ON THE PHASE I WORK PLAN FOR THE OPERABLE UNIT 4 PILOT PLANT	06/01/1994	DOE-FN EPAs	10	RESPONSES
U-006-306.50	DOE-2187-94 5851	OPERABLE UNIT 4 PILOT PLANT PHASE II TREATABILITY STUDY WORK PLAN	08/04/1994	DOE-FN EPAs	18	COMMENTS/LET
U-006-307.1	4635	GEOLOGY OF CINCINNATI AND VICINITY 1916			217	Report
U-006-307.2	4612	RAINFALL AND RUNOFF IN THE MIAMI VALLEY STATE OF OHIO MIAMI CONSERVANCY DISTRICT 1921	01/01/1921		235	Report
U-006-307.3	4637	PROCESS ENGINEERING REPORT OPERATING MANUAL FOR K-65 STORAGE AREA FEED MATERIAL PRODUCTION CENTER, FERNALD, OHIO		CCC, INC. USAEC	50	Report
U-006-307.4	4702	K-65 STORAGE TANK NO.1	11/25/1953	NLO	1	Memorandum
U-006-307.5	4703	K-65 STORAGE TANKS	12/01/1953	USAEC NLO	1	Letter
U-006-307.6	4704	LEASE OF FACILITIES TO AFRICAN METALS	07/15/1958	USAEC NLO	1	Letter
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U-006-307.9	4636	SCOPING INVESTIGATION OF SHORT-TERM STORAGE COSTS FOR AFRIMET RESIDUES - NFSS AND FMPC SEPTEMBER 29, 1980	09/29/1980	NLO DOE-FN	49	Report
U-006-307.10	4613	SOIL SURVEY OF BUTLER COUNTY, OHIO	01/01/1980	USAG	259	Report
U-006-307.11	BMI-2083 4681	UC-11 PRELIMINARY ASSESSMENT OF ALTERNATIVES FOR PROCESSING AND DISPOSAL OF THE AFRIMET RESIDUES FINAL REPORT 1981	05/15/1981	BATELLE DOE	64	Report
U-006-307.12		SOIL SURVEY OF HAMILTON COUNTY, OHIO 4614	08/01/1982	USAG	286	Report
U-006-307.13	4610	FIRM FLOOD INSURANCE RATE MAP COUNTY OF HAMILTON OHIO	06/01/1982	FEMA	1	Map
U-006-307.14	4440	FEASIBILITY INVESTIGATION FOR CONTROL OF RADON EMISSION FROM THE K-65 SILOS	07/30/1987	WEMCO DOE	100	Report
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U-006-307.16	FMPC-2142 4603	THE K-65 WASTE STORAGE SILOS AT THE FEED MATERIALS PRODUCTION CENTER SEPTEMBER 1988	09/01/1988	WEMCO DOE-ORO	12	Report
U-006-307.17	4445	SAMPLING AND RADIOLOGICAL ANALYSES OF SEDIMENT FROM PADDY'S RUN AND THE STORM SEWER OUTFALL DITCH	09/07/1989	IT ASI	3	Memorandum
U-006-307.18	4770	TOPOGRAPHIC SURVEY AND GEOTECHNICAL INVESTIGATION FMPC WATER POLLUTION CONTROL FERNALD, OHIO	10/05/1982	ATEC ASSOC. NLO	75	REPORT

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U-006-307.20	4943	TREATMENT OF PITCHBLENDE RESIDUES FOR RECOVERY OF METAL VALUES (JOHN E. LITZ)	05/30/1974	HAZEN RESEARCH COTTER CORP	30	REPORT
U-006-307.21	4944	WASTE WATER QUALITY REPORTS, NPDES PERMIT PARAMETERS AND DATA SUMMARIES 1979 TO 1983		NLO	250	REPORTS
U-006-307.22	5030	ECOREGIONS OF THE UNITED STATES BY ROBERT G. BAILEY U.S. FOREST SERVICE 1976	01/01/1976		1	MAP
U-006-307.23	5031	GLACIAL GEOLOGIC MAPPING IN HAMILTON COUNTY, OHIO (REPORT OF PROGRESS ON THE FIRST PHASE) BY C. SCOTT BROCKMAN SEPTEMBER 1986 OHIO DEPT. NATURAL RESOURCES, DIV. GEOLOGICAL SURVEY	09/01/1986		17	REPORT
U-006-307.24	5032	RADIOLOGICAL AND CHEMICAL BASELINE RISK ASSESSMENT OPERABLE UNIIT 4 APRIL 2, 1990 PRELIMINARY DRAFT	04/02/1990	IT CORP DOE-ORO	150	REPORT
U-006-307.25	5033	BEDROCK TOPOGRAPHY OF BUTLER COUNTY, OHIO BY JACK A. LEOW JULY 1985 OHIO DEPT. NATURAL RESOURCES, DIV. GEOLOGICAL SURVEY	07/01/1985		1	MAP
U-006-307.26	5034	GROUND-WATER HYDROLOGY AND GEOLOGY OF THE LOWER GREAT MIAMI RIVER VALLEY, OHIO BY ANDREW M. SPIEKER 1968 U.S. GEOLOGICAL SURVEY PROFESSIONAL PAPER	01/01/1968		40 605-A	REPORT
U-006-307.27	5035	FUTURE DEVELOPMENT OF THE GROUND-WATER RESOURCE IN THE LOWER GREAT MIAMI RIVER VALLEY, OHIO - PROBLEMS AND SOLUTIONS BY ANDREW M. SPIEKER 1968 U.S. GEOLOGICAL SURVEY PROFESSIONAL PAPER 605-D	01/01/1968		50	REPORT

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U-006-307.29	5450	BEDROCK GEOLOGY OF THE CINCINNATI WEST QUADRANGLE AND PART OF THE COVINGTON QUADRANGLE, HAMILTON COUNTY, OHIO BY JOHN P. FORD 1974 OHIO DIV GEOLOGICAL	01/01/1974		2	REPORT
U-006-307.30	5451	BEDROCK GEOLOGY OF HAMILTON COUNTY, OHIO BY M. SWINFORD OHIO DIV GEOLOGICAL SURVEY (IN PREPARATION)	11/10/1992		22	REPORT
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U-006-401.3	DOE-1317-90 417	APPLICABLE RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) FOR OPERABLE UNIT 4	06/27/1990	DOE USEPA	64	Letter
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U-006-402.1	DOE-1166-90 336	INITIAL SCREENING OF ALTERNATIVES FOR OPERABLE UNIT 4	06/01/1990	DOE EPAs	2	Letter
U-006-402.2	FMPC-0412-4 299	INITIAL SCREENING OF ALTERNATIVES FOR OPERABLE UNIT 4 TASK 12 REPORT MAY 1990	05/01/1990	DOE EPAs	132	Report
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U-006-404.2	 4738	FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 4 REMEDIAL INVESTIGATION AND FEASIBILITY STUDY VOLUME 1 OF 4 DRAFT SEPTEMBER 1993	09/08/1993	DOE-FN EPAs	600	Report
U-006-404.3	 4739	FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 4 REMEDIAL INVESTIGATION AND FEASIBILITY STUDY VOLUME 2 OF 4 DRAFT SEPTEMBER 1993	09/08/1993	DOE-FN EPAs	600	Report

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U-006-404.6	DOE-0383-94 4924	REQUEST FOR EXTENSION ON SUBMITTAL OF THE OPERABLE UNIT 4 DRAFT FINAL FEASIBILITY STUDY REPORT AND PROPOSED PLAN	11/22/1993	DOE-FN EPAs	2	LETTER
U-006-404.7	DOE-0636-94 5037	OPERABLE UNIT 4 DRAFT FINAL FEASIBILITY STUDY REPORT/PROPOSED PLAN	12/21/1993	DOE EPAs	2	LETTER
U-006-404.8	DOE/EIS-0195D 5038	FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 4 VOLUME 1 OF 4 DECEMBER 1993 DRAFT FINAL	12/21/1993	DOE EPAs	700	REPORT
U-006-404.9	DOE/EIS-0195D 5039	FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 4 VOLUME 2 OF 4 DECEMBER 1993 DRAFT FINAL	12/21/1993	DOE EPAs	700	REPORT
U-006-404.10	DOE/EIS-0195D 5040	FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 4 VOLUME 3 OF 4 DECEMBER 1993 DRAFT FINAL	12/21/1993	DOE OEPA	700	REPORT
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U-006-404.13	DOE/EIS-0195D 5205	FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 4 VOLUME 1 OF 4 FINAL FEBRUARY 1994	02/22/1994	DOE-FN EPAs	683	REPORT
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U-006-404.16	DOE/EIS-0195D 5208	FEASIBILITY STUDY REPORT FOR OPERABLE UNIT 4 VOLUME 4 OF 4 FINAL FEBRUARY 1994	02.22.1994	DOE-FN EPAs	815	REPORT
U-006-405.1	DOE/EIS-0195D 4742	PROPOSED PLAN FOR OEPRABLE UNIT 4 DRAFT AUGUST 1993	09/08/1993	DOE-FN EPAs	100	Work Plan
U-006-405.2	DOE/EIS-0195D 5042	PROPOSED PLAN FOR REMEDIA ACTIONS AT OPERABLE UNIT 4 DECEMBER 1993 DRAFT FINAL	12/21/1993	DOE OEPA	100	REPORT
U-006-405.3	DOE/EIS-0195D 5209	PROPOSED PLAN FOR REMEDIAL ACTIONS AT OPERABLE UNIT 4 FINAL FEBRUARY 1994	02/22/1994	DOE-FN EPAs	105	REPORT
U-006-407.1		OU#4 ALTERNATIVES U.S. DOE FERNALD OH 6 890 008 976 893	07/05/1990	USEPA DOE	15	Letter
U-006-407.2	894	OHIO EPA COMMENTS - OPERABLE UNIT 4 INITIAL SCREEENING OF ALTERNATIVES REPORT	07/06/1990	OEPA DOE	6	Letter
U-006-407.3	1928	OU#4 - ALTERNATIVES U.S. DOE - FERNALD OH6 890 008 976	09/04/1990	USEPA DOE	5	Letter
U-006-407.4	2135	OU#4 DISPUTE RESOLUTION U.S. DOE FERNALD OH6 890 008 976	10/03/1990	USEPA DOE	2	Letter
U-006-407.5	2136	OU#4 ALT SCREENING DISPUTE RESOLUTION U.S. DOE FERNALD OH6 890 008 976	10/18/1990	USEPA DOE	2	Letter
U-006-407.6	1813	OU#4 ALT SCREENING DISPUTE RESOLUTION U.S. DOE FERNALD OH6 890 008 976	10/31/1990	USEPA DOE	1	Letter
U-006-407.7	1173	EXTENSION REQUEST OU #4 FS REPORT U.S. DOE FERNALD OH6 890 008 976	12/19/1990	USEPA DOE	2	Letter

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U-006-407.10	4907	OHIO EPA COMMENTS ON THE OU 4 FEASIBILITY STUDY REPORT AND PROPOSED PLAN	11/09/1993	OEPA DOE-FN	18	COMMENTS
U-006-407.11	4909	DISAPPROVAL OF THE O.U. 4 FEASIBILITY STUDY AND PROPOSED PLAN	11/09/1993	USEPA DOE-FN	66	COMMENTS
U-006-407.12	4930	APPROVAL OF THE CLARIFICATION TO THE OU 4 FEASIBILITY STUDY DOCUMENT CHANGE REQUEST	11/24/1993	USEPA DOE-FN	1	LETTER
U-006-407.13	5121	OHIO EPA COMMENTS ON THE REVISED O.U. 4 FS/PP	01/24/1994	OEPA DOE-FN	18	COMMENTS
U-006-407.14	5145	CONDITIONAL APPROVAL OF THE DRAFT FINAL OU 4 FEASIBILITY STUDY REPORT AND PROPOSED PLAN	02/09/1994	USEPA DOE-FN	18	COMMENTS
U-006-407.15	5532	APPROVAL OF THE FINAL OU 4 FEASIBILITY STUDY REPORT AND PROPOSED PLAN (CONDITIONAL APPROVAL)	05/09/1994	USEPA DOE-FN	6	COMMENTS
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U-006-408.2	DOE-1853-90 1927	INFORMAL DISPUTE RESOLUTION MEETING	09/07/1990	DOE USEPA	2	Letter
U-006-408.3	DOE-1772-90 1681	OPERABLE UNIT 4	09/24/1990	DOE ASI	1	Letter
U-006-408.4	DOE-46-91 1672	OPERABLE UNIT 4 - DISPUTE RESOLUTION	10/11/1990	DOE USEPA	3	Letter

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U-006-408.6	DOE-208-91 1847	OPERABLE UNIT 4 - FEASIBILITY STUDY (FS) REPORT	11/06/1990	DOE-FSO USEPA	1	Letter
U-006-408.7	DOE-401-91 913	OPERABLE UNIT 4 - FEASIBILITY STUDY (FS) REPORT	12/13/1990	DOE USEPA	2	Letter
U-006-408.8	DOE-551-91 960	OPERABLE UNIT 4 - PROPOSED PLAN	01/10/1991	DOE USEPA	2	Letter
U-006-408.9	DOE-333-92 2507	OPERABLE UNIT 4 - APPLICABLE OR RELEVANT AND APPROPRAITE REQUIREMENTS (ARARS)	11/18/1991	DOE EPAs	3	Letter
U-006-408.10	5043	FEASIBILITY STUDY REPORT AND PROPOSED PLAN FOR OPERABLE UNIT 4 RESPONSES TO COMMENTS DECEMBER 1993	12/21/1993	DOE EPAs	100	RESPONSES
U-006-408.11	DOE-1944-92 3343	OPERABLE UNIT (OU) ARARS	06/18/1992	DOE USEPA	2	Letter
U-006-408.12	5210	RESPONSES TO COMMENTS ON THE DRAFT FINAL FEASIBILITY STUDY REPORT AND PROPOSED PLAN FOR OPERABLE UNIT 4 FEBRUARY 1994	02/22/1994	DOE-FN EPAs	118	RESPONSES
U-006-408.13	DOE-1514-94 5478	OPERABLE UNIT 4 CONSENT AGREEMENT SCHEDULE - REQUEST FOR EXTENSION OF THE FEASIBILITY STUDY/PROPOSED PLAN-DRAFT ENVIRONMENTAL IMPACT STATEMENT PUBLIC REVIEW	04/18/1994	DOE-FN EPAs	4	LETTER
U-006-408.14	DOE-1847-94 5629	RESPONSES TO COMMENTS - OPERABLE UNIT 4 FINAL FEASIBILITY STUDY/PROPOSED PLAN/DRAFT ENVIRONMENTAL IMPACT STATEMENT	06/03/1994	DOE-FN EPAs	2	LETTER
U-006-408.15	5630	FINAL FEASIBILITY STUDY REPORT AND PROPOSED PLAN FOR OPERABLE UNIT 4 RESPONSE TO COMMENTS JUNE 1994	06/03/1994	DOE-FN EPAs	16	RESPONSES

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U-006-409.2	5448	TREATIBILITY STUDY REPORT FOR OPERABLE UNIT 4 DRAFT MARCH 31, 1993	03/31/1994	DOE-FN	500	REPORT
U-006-409.3	5498	TECH REPORT Y-87-1 CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL WETLANDS RESEARCH PROGRAM TECHNICAL REPORT Y-87-1 FINAL REPORT JANUARY 1987 BY ENVIRONMENTAL	01/02/1987	US ARMY	100	REPORT
U-006-409.4	5449	FEED MATERIALS PRODUCTION CENTER, NEAR FERNALD, OHIO	05/05/1987	OHIO HIS SOC DOE-FMPC	1	LETTER
U-006-409.5	5309	DEPARTMENT OF ENERGY INTENT TO PREPARE A REMEDIAL INVESTIGATION/FEASIBILITY STUDY - ENVIRONMENTAL IMPACT STATEMENT FOR THE FIRST OF FIVE REMEDIAL ACTIONS AT THE	05/15/1990	DOE	8	NOTICE
U-006-409.6	DOE/NV/10630-20 5453	U.S. DEPARTMENT OF ENERGY NEVADA OPERATIONS OFFICE ANNUAL SITE ENVIRONMENTAL REPORT - 1990 VOLUME 1 SEPTEMBER 1991	09/01/1991	DOE-NEVADA	200	REPORT
U-006-409.7	5497	A PHASE I CULTURAL RESOURCES RECONNAISSANCE OF THE FEED MATERIALS PRODUCTION CENTER ALTERNATE WATER SUPPLY SYSTEM, FERNALD, HAMILTON COUNTY, OHIO BY US ARMY	09/01/1992	US ARMY DOE-FN	65	REPORT
U-006-501.1	DOE-2185-94 5812	OPERABLE UNIT 4 DRAFT RECORD OF DECISION/RESPONSIVENESS SUMMARY	08/05/1994	DOE-FN EPAs	569	REPORT
U-006-504.1	5902	APPROVAL OF THE DRAFT OU 4 RECORD OF DECISION	09/01/1994	USEPA DOE-FN	5	LETTER
U-006-707.1	DOE-0245-94 4855	OPERABLE UNIT 4 REMEDIAL INVESTIGATION/FEASIBILITY STUDY SCHEDULE	11/03/1993	DOE-FN EPAs	8	LETTER
U-006-707.2	5073	U.S. EPA/OHIO EPA MAJOR COMMENT RESOLUTION MEETING ON THE FEASIBILITY STUDY REPORT AND PROPOSED PLAN FOR REMEDIAL ACTION AT OPERABLE UNIT 4	11/22/1993	DOE-FN/FERMCO EPAs	4	MINUTES

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U-006-710.1	5531	U.S. DOE REQUEST FOR EXTENSION ON THE OU #4 DRAFT RECORD OF DECISION	04/29/1994	USEPA DOE-FN	6	LETTER
U-006-710.2	DOE-1640-94 5515	OPERABLE UNIT 4 RECORD OF DECISION EXTENSION - FORMAL AMENDED CONSENT AGREEMENT AMENDMENT	05/05 1994	DOE-FN EPAs	6	LETTER
U-006-710.2	DOE-1734-94 5572	OPERABLE UNIT 4 CONSENT AGREEMENT SCHEDULE - REQUEST FOR EXTENSION OF THE FEASIBILITY STUDY/PROPOSED PLAN-DRAFT ENVIRONMENTAL IMPACT STATEMENT PUBLIC REVIEW PERIOD AND THE SUBMITTAL OF THE DRAFT RECORD OF DECISION TO THE USEPA	05/19/1994	DOE-FN EPAs	2	LETTER
U-006-710.4	5633	U.S. DOE REQUEST FOR SECOND EXTENSION OF THE OU #4 DRAFT RECORD OF DECISION	05/26/1994	USEPA DOE-FN	6	NOTICE
U-006-710.5	DOE-1860-94 5646	OPERABLE UNIT 4 RECORD OF DECISION EXTENSION - FORMAL AMENDED CONSENT AGREEMENT AMENDMENT	06/13/1994	DOE-FN	7	LETTER
U-006-710.6	5791	U.S. DOE OU #4 DRAFT RECORD OF DECISION EXTENSION AMENDMENT	07/25/1994	USEPA DOE-FN	5	LETTER
U-006-1003.1	308	THE USDOE ANNOUNCES THE AVAILABILITY FOR PUBLIC REVIEW OF THE INITIAL SCREENING OF ALTERNATIVES FOR OEPRABLE UNIT 4 (SILOS 1,2,3,& 4) AT THE DOE'S FMPC AT FERNALD, OHIO	06/04/1990	DOE PUBLIC	1	NOA
U-006-1003.2	326	THE USDOE ANNOUNCES THE AVAILABILITY FOR PUBLIC REVIEW OF THE INITIAL SCREENING OF ALTERNATIVES FOR OPERABLE UNIT 4 (SILOS 1,2,3,4) AT THE DOE FMPC AT FERNALD, OHIO	05/30/1990	DOE PUBLIC	1	NOA
U-006-1003.8	C:OP:93-484 4293	APPROVAL OF NOTICE OF AVAILABILITY (NOA) FOR OPERABLE UNIT 4 REMEDIAL INVESTIGATION REPORT	04/16/1993	FERMCO DOE	1	

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U-006-1003.10	C:OP:93-484 4959	APPROVAL OF NOTICE OF AVAILABILITY (NOA) FOR OPERABLE UNIT 4 REMEDIAL INVESTIGATION REPORT	04/16/1993	FERMCO DOE	1	LETTER
U-006-1003.11	4960	THE USDOE ANNOUNCES THE AVAILABILITY FOR PUBLIC REVIEW AND COMMENT OF THE ADMINISTRATIVE RECORD FILE FOR THE OPERABLE UNIT 4 REMEDIAL INVESTIGATION REPORT AT THE DOE FEMP, FERNALD, OHIO	04/06/1993	DOE PUBLIC	1	NOA
U-006-1003.12	C:P:93-1343 4963	APPROVAL FOR NOTICE OF AVAILABILITY (NOA) FOR THE OPERABLE UNIT 4 DRAFT FEASIBILITY STUDY REPORT AND DRAFT PROPOSED PLAN	09/13/1993	FERMCO DOE	1	LETTER
U-006-1003.13	4964	THE USDOE ANNOUNCES THE AVAILABILITY FOR PUBLIC INSPECTION OF THE DRAFT FEASIBILITY STUDY REPORT AND DRAFT PROPOSED PLAN FOR OPERABLE UNIT 4 AT THE DOE FEMP, FERNALD, OHIO	09/13/1993	DOE PUBLIC	2	NOA
U-006-1003.14	C:ENV:94-0006 5183	APPROVAL FOR NOTICE OF AVAILABILITY (NOA) OF THE OPERABLE UNIT 4 FEASIBILITY STUDY REPORT/PROPOSED PLAN - DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR FORMAL PUBLIC COMMENT	02/23/1994	FERMCO DOE-FN	3	LETTER
U-006-1003.15	5184	THE USDOE AT THE FEMP, FERNALD, OHIO, ANNOUNCES THE AVAILABILITY OF THE OPERABLE UNIT 4 FEASIBILITY STUDY REPORT/PROPOSED PLAN - DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR FORMAL PUBLIC COMMENT	03/02/1994	DOE-FN PUBLIC	2	NOA
U-006-1003.16	C:ENV:94-0016 5483	APPROVAL FOR NOTICE OF AVAILABILITY (NOA) FOR EXTENDING THE PUBLIC COMMENT PERIOD FOR OPERABLE UNIT 4 FESIBILITY STUDY/PROPOSED PLAN - DRAFT ENVIRONMENTAL	04/19/1994	FERMCO DOE-FN	1	LETTER
U-006-1003.17	5484	THE USDOE FEMP ANNOUNCES THE EXTENSION OF THE PUBLIC REVIEW AND COMMENT PERIOD ON THE OPERABLE UNIT 4 FEASIBILITY STUDY REPORT/PROPOSED PLAN-DRAFT	04/19/1994	DOE-FN PUBLIC	1	NOA

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U-006-1003.19	5582	THE USDOE FERNALD ENVIRONMENTAL MANAGEMENT PROJECT ANNOUNCES THE EXTENSION OF THE PUBLIC REVIEW AND COMMENT PERIOD ON THE OPERABLE UNIT 4 FEASIBILITY STUDY PROPOSED PLAN-DRAFT ENVIRONMENTAL IMPACT STATEMENT	05/18/1994	DOE-FN PUBLIC	1	NOA
U-006-1003.20	C:ENV:94-0032 5828	APPROVAL FOR NOTICE OF AVAILABILITY (NOA) FOR DRAFT RECORD OF DECISION FOR REMEDIAL ACTIONS AT OPERABLE UNIT 4	06/27/1994	FERMCO DOE-FN	2	LETTER
U-006-1003.21	5829	THE UNITED STATES DEPARTMENT OF ENERGY ANNOUNCES THE AVAILABILITY FOR PUBLIC INSPECTION THE PROPOSED DRAFT RECORD OF DECISION FOR REMEDIAL ACTION AT OPERABLE UNIT 4 AT THE FERNALD ENVIRONMENTAL MANAGEMENT PROJECT	08/17/1994	DOE-FN PUBLIC	1	NOA
U-006-1004.2	5369	U.S. DEPARTMENT OF ENERGY PUBLIC MEETING MARCH 21, 1994	03/21/1994	DOE-FN PUBLIC	65	TRANSCRIPT
U-006-1005.1	5417	PUBLIC HEARING AND FORMAL COMMENT SESSION ON THE PROPOSED PLAN FOR OPERABLE UNIT 4	03/14/1994	DOE-FN PUBLIC	1	NOTICE
U-006-1005.2	5418	AGENDA, OVERHEADS AND HANDOUTS FROM THE PUBLIC HEARING OF THE OPERABLE UNIT 4 PROPOSED PLAN MARCH 21, 1994	03/21/1994	DOE-FN PUBLIC	65	HANDOUTS
U-006-1005.3	5419	PUBLIC HEARING SIGN-IN SHEETS FROM THE OPERABLE UNIT 4 FEASIBILITY STUDY/PROPOSED PLAN-DRAFT ENVIRONMENTAL IMPACT STATEMENT HELD MARCH 21, 1994	03/21/1994	DOE-FN	42	ROSTER
U-006-1006.1	5189	FACT SHEET FOR THE PROPOSED PLAN FOR REMEDIAL ACTIONS AT OPERABLE UNIT 4 SILOS 1-4 FEBRUARY 1994	02/18/1994	DOE-FN PUBLIC	16	FACT SHEET

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R-008-101.3	1298	K-65 AREA WEEKLY REPORT JUNE 6, 1991	06/06/1991	DOE USEPA	4	Report
R-008-101.4	1369	K-65 AREA WEEKLY REPORT JUNE 14, 1991	06/14/1991	DOE USEPA	4	Report
R-008-101.5	1564	K-65 AREA WEEKLY REPORT JUNE 21, 1991	06/21/1991	DOE USEPA	7	Report
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R-008-101.8	1741	K-65 WEEKLY REPORT JULY 19, 1991	07/19/1991	DOE USEPA	10	Report
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R-008-101.10	1896	K-65 WEEKLY REPORT AUGUST 2, 1991	08/02/1991	DOE EPAs	4	Report
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R-008-101.16	2237	K-65 WEEKLY REPORT SEPTEMBER 20, 1991	09/20/1991	DOE EPAs	4	Report
R-008-101.17	2209	K-65 WEEKLY REPORT FOR SEPTEMBER 27, 1991	09/27/1991	DOE EPAs	7	Report
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R-008-101.21	2359	K-65 WEEKLY REPORT OCTOBER 25, 1991	10/25/1991	DOE EPAs	4	Report
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R-008-101.28	5348	K-65 WEEKLY REPORT SEPTEMBER 6, 1991	09/06/1991	DOE EPAs	4	REPORT
R-008-105.1	1432	REVIEW OF THE K-65 SILOS STUDIES FOR THE FMPC APRIL 1, 1991	04/01/1991	SANDIA NL DOE	27	Report
R-008-106.1	DOE-745-92 2703	SILOS 1 AND 2 REMOVAL ACTION BENTONITE EFFECTIVENESS ENVIRONMENTAL MONITORING PLAN	01/27/1992	DOE EPAs	2	Letter
R-008-106.2	DOE-1015-92 3030	REVISED SILO 1 AND 2 REMOVAL ACTION BENTONITE EFFECTIVENESS ENVIRONMENTAL MONITORING PLAN	03/17/1992	DOE EPAs	2	Letter
R-008-106.3	DOE-1382-92 3184	SILOS 1 & 2 REMOVAL ACTION BENTONITE EFFECTIVENESS ENVIRONMENTAL MONITORING PLAN	04/16/1992	DOE EPAs	2	Letter
R-008-106.4	DOE-1742-92 3290	BENTONITE EFFECTIVENESS MODEL RESULT FOR JANUARY THROUGHT APRIL, 1992	05/22/1991	DOE EPAs	2	Letter
R-008-106.5	DOE-2022-92 3512	BENTONITE EFFECTIVENESS MODEL RESULT FOR MAY 1992	06/30/1992	EPA DOE	3	Letter
R-008-108.1	NEPA DOC 278 4479	EVALUATION OF STRUCTURAL STABILITY OF THE K-65 SILOS AT FERNALD NEPA DOC 278	10/30/1989	DOE-FMPC DOE-HQ	2	Report
R-008-201.1	DOE-1060-90 3047	REMOVAL SITE EVALUATION K-65 SILOS	05/21/1990	DOE-FO WMCO	1	Letter

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R-008-203.1	444	A BASELINE RISK ASSESSMENT FOR THE K065 SILOS USING EPA METHODOLOGY FOR APPLICABILITY TO THE EE/CA MAY 11, 1990	05/11/1990	UC DOE-FMPC	132	Report
R-008-203.2	DOE-1537-90 1244	TRANSMITTAL OF THE K-65 SILOS EE/CA - CONSENT AGREEMENT DELIVERABLE	07/31/1990	DOE-FMPC EPAs	2	Letter
R-008-203.3	443	ENGINEERING EVALUATION/CPST ANALYSIS (EE/CA) K-65 SILOS REMOVAL ACTION AT THE FMPC JULY 1990	07/31/1990	BNI DOE	135	Report
R-008-203.4	3270	ENGINEERING EVALUATION/COST ANALYSIS - ENVIRONMENTAL ASSESSMENT FOR THE K-65 SILOS REMOVAL ACTION, FEMP	11/14/1991	DOE DUFFY	2	Letter
R-008-203.5	3271	FINDING OF NO SIGNIFICANT IMPACT ENGINEERING EVALUATION/COST ANALYSIS - ENVIRONMENTAL ASSESSMENT K-65 SILOS REMOVAL ACTION FERNALD ENVIRONMENTAL	11/14/1991	DOE	9	Report
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R-008-204.2	PM&A-PM4-91-406 5349	RISK MANAGEMENT PLAN FOR OPERABLE UNIT 4 SILOS 1 & 2 (K-65) REMOVAL ACTION	09/11/1991	WEMCO DOE	19	REPORT
R-008-204.3	5444	SILOS 1 AND 2 OPERATIONAL SAFETY REQUIREMENTS REVISION NO. 4 NOVEMBER 1991	11/01/1991	PARSONS DOE-FN	25	REPORT
R-008-204.4	DOE-213-91 2336	K-65 SILOS REMOVAL ACTION WORK PLAN	11/02/1991	DOE-FMPC EPAs	2	Letter
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R-008-204.8	1562	FERNALD SILO #4 REMOTE SURFACE MAPPING TECHNOLOGY SUPPORT DEMONSTRATION WORK PLAN MAY 1991	05/01/1991	DOE EPAs	49	WORK PLAN
R-008-204.9	DOE-0650-93 4009	BENTONITE EFFECTIVENESS EVALUATION FOR OPERABLE UNIT 4 AT THE FERNALD ENVIRONMENTAL MANAGEMENT PROJECT	12/17/1992	DOE-FN EPAs	2	Letter
R-008-204.10	4010	K-65 SILO REMOVAL ACTION - BENTONITE EFFECTIVENESS EVALUATION DECEMBER 17, 1992	12/17/1992	DOE-FN EPAs	200	Report
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R-008-205.10	WMCO:EMT:90-869 1006	APPROVAL FOR RUST FORCE ACCOUNT TO COMPLETE THE SILOS 1 AND 2 REMOVAL ACTION	12/18/1990	WMCO DOE	3	Letter
R-008-205.18	WEMCO:ER:92-158 3015	TIGER TEAM COMMITMENT NO. TT:89:0243 (TTA#611) - INTERIM STABILIZATION (FFCA) AND COMPLETE CHARACTERIZATION REQUIRED (K-65 SILOS)	03/17/1992	WEMCO DOE	2	Letter
R-008-205.20	DCR65A 4452	K-65 SILO VERTICAL BORING SAMPLING AND ANALYSIS PLAN RI/FS WORK PLAN ADDENDUM MARCH 1991	03/01/1991		4	Addendum
R-008-206.3	2830	CHARACTERISTICS OF FENRALD'S K-65 RESIDUE BEFORE, DURING AND AFTER VITRIFICATION FEBRUARY 1991	02/01/1991		50	Report
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R-008-206.6	C:OP:93-1284 4749	K-65 SILOS - HEADSPACE RADON CONCENTRATION	09/09/1993	FERMCO DOE-FN	4	LETTER
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R-008-207.7	2456	OU#4 - REMOVAL #4 K-65 BORINGS U.S. DOE FERNALD OH6 890 008 976	08/27/1990	USEPA / DOE	3	Letter
R-008-207.8	547	EE/CA K-65 REMOVAL #4 U.S. DOE-FERNALD OH6 890 008 976	09/04/1990	USEPA / DOE	3	Letter
R-008-207.9	1711	K-65 EE/CA	09/05/1990	OEPA / DOE	2	Letter
R-008-207.11	1879	EE/CA K-65 REMOVAL #4 U.S. DOE-FERNALD OH6 890 008 976	10/18/1990	USEPA / DOE	2	Letter
R-008-207.12	919	REMOVAL #4 WORK PLAN U.S. DOE-FERNALD OH6 890 008 976	11/30/1991	USEPA / DOE	2	Letter
R-008-207.13	1794	CONDITIONAL APPROVAL OF K-65 REMOVAL WORK PLAN	12/05/1990	OEPA / DOE	1	Letter
R-008-207.16	2804	BACKGROUND INFORMATION ON HOW TARGET RADON CONCETRATION WAS DERIVED	01/29/1992	USEPA / DOE	2	Letter
R-008-207.19	2453	APPROVAL - REMOTE SURFACE MAPPING TECHONLOGY SUPPORT DEMONSTRATION ON FERNALD SILO 4 WORK PLAN	07/25/1991	OEPA / DOE	1	Letter
R-008-207.21	2903	DISAPPROVAL OF THE SILO 1 AND 2 REMOVAL ACTION BENTONITE EFFECTIVENESS ENVIRONMENTAL MONITORING PLAN	12/19/1992	USEPA / DOE	1	Letter
R-008-207.22	3168	APPROVAL OF THE REVISED SILO 1 AND 2 REMOVAL ACTION BENTONITE EFFECTIVENESS ENVIRONMENTAL MONITORING PLAN	04/21/1992	USEPA / DOE	1	Letter
R-008-207.23	4129	DISAPPROVAL OF THE BENTONITE EFFECTIVENESS EVALUATION FOR OU4	02/12/1993	USEPA / DOE-FN	25	Comment

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R-008-208.7	DOE-1904-90 1680	EXTENSION OF PUBLIC COMMENT PERIOD FOR THE K-65 EE/CA	09/11/1990	DOE EPAs	2	Letter
R-008-208.9	DOE-1870-90 1732	K-65 SILOS REMOVAL ACTION	09/27/1990	DOE EPAs	2	Letter
R-008-208.11	DOE-19-91 1908	K-65 SILOS REMOVAL ACTION - INFORMAL DISPUTE RESOLUTION	10/04/1990	DOE USEPA	2	Letter
R-008-208.12	DOE-35-91 1933	K-65 ACTION REMOVAL - STATEMENT OF DISPUTE	10/11/1990	DOE USEPA	3	Letter
R-008-208.14	DOE-131-91 1932	K-65 REMOVAL ACTION	10/22/1990	DOE USEPA	3	Letter
R-008-208.15	DOE-557-91 5346	RESPONSE TO OHIO EPA COMMENTS ON THE SILOS 1 AND 2 REMOVAL ACTION WORK PLAN	01/11/1991	DOE-FMPC OEPA	31	RESPONSES
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R-008-208.21	DOE-1023-91 2182	K-65 SILOS WORKING GROUP STATUS REPORT	03/28/1991	DOE K-65 SR. COMMITTEE	1	Letter
R-008-208.22	DOE-1186-91 2979	MAJOR POINTS AND ISSUES RESULTING FROM THE APRIL 10, 1991 MEETING	04/22/1991	DOE EPAs	7	Letter

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R-008-208.23	DOE-1359-91 1287	MAJOR POINTS OF DISCUSSION	05/17/1991	DOE EPAs	10	Letter
R-008-208.25	DOE-1508-91 1366	K-65 TABLETOP EXERCISE	06/11/1991	DOE EPAs	4	Letter
R-008-208.29	DOE-382-92 2515	DELAY OF THE INITIATION OF THE INSTALLATION OF THE BENTONITE IN SILOS 1 AND 2	11/20/1991	DOE EPAs	2	Letter
R-008-209.1	DOE-871-88 4374	COMPLETION REPORT FOR THE EXTERIOR FOAM APPLICATION/RADON TREATMENT SYSTEM OPERATION OF THE K-65 INTERIM STABILIZATION PROJECT - FEED MATERIALS PRODUCTION CENTER	05/23/1988	DOE USEPA	50	Report
R-008-209.2	5528	DRAFT FINAL REPORT FOR THE SILOS 1 & 2 (K-65) REMOVAL ACTION MAY 1994	05/17/1994	DOE-FN EPAs	146	REPORT
R-008-1002.1	5905	ADDENDUM TO THE RI/FS COMMUNITY RELATIONS PLAN FOR REMOVAL ACTION NO.4 SILOS 1 AND 2 AUGUST 1990	08/01/1990	DOE-FN EPAs	5	ADDENDUM
R-008-1003.1	447	THE USDOE ANNOUNCES THE AVAILABILITY FOR PUBLIC REVIEW OF THE ENGINEERING EVALUATION/COST ANALYSIS FOR THE K-65 SILOS (SILOS 1 AND 2) REMOVAL ACTION AT THE DOE FMPC AT FERNALD, OHIO	08/01/1990	DOE PUBLIC	2	NOA
R-008-1003.2	305	THE USDOE ANNOUNCES THE AVAILABILITY OF THE ADMINISTRATIVE RECORD FILE FOR THE K-65 SILOS (SILOS 1 AND 2) REMOVAL ACTION AT THE DOE'S FMPC AT FERNALD, OHIO	05/07/1990	DOE PUBLIC	1	NOA
R-008-1004.1	4068	K-65 SILOS REMOVAL ACTION COMMUNITY WORKSHOP AND SITE SPECIFIC PLAN PRESENTATION AUGUST 16, 1990	08/16/1991	DOE-FN	150	Transcript

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R-014-201.1	DOE-1784-90 901	REMOVAL ACTION MEMORANDUM: K-65 DECANT SUMP TANK	08/23/1990	DOE WMCO	2	Letter
R-014-202.1	WMCO:EMT:90-539 485	REMOVAL SITE EVALUATION K-65 DECANT SUMP TANK WATER	08/17/1990	WMCO DOE	8	RSE
R-014-204.1	539	K-65 DECANT SUMP TANK REMOVAL ACTION WORK PLAN FMPC DRAFT	09/01/1990	WMCO DOE-ORO	45	Work Plan
R-014-204.2	DOE-76-91 2187	K-65 DECANT SUMP TANK REMOVAL ACTION WORK PLAN	10/17/1990	DOE EPAs	2	Letter
R-014-204.3	546	K-65 DECANT SUMP TANK REMOVAL ACTION WORK PLAN FMPC SEPTEMBER 1990	09/01/1990	DOE EPAs	49	Work Plan
R-014-204.4	905	K-65 DECANT SUMP TANK REMOVAL ACTION WORK PLAN FMPC DECEMBER 1990	12/01/1990	DOE EPAs	71	Work Plan
R-014-204.5	5441	K-65 DECANT SUMP TANK REMOVAL ACTION RISK MANAGEMENT PLAN MARCH 1991	03/01/1991	WEMCO DOE-FN	6	WORK PLAN
R-014-207.1	1994	REMOVAL #5 K-65 DECANT TANK U.S. DOE-FERNALD OH6 890 008 976	11/13/1990	USEPA DOE	4	Letter
R-014-207.2	1789	COMMENTS K-65 DECANT SUMP TANK REMOVAL W.P.	11/19/1990	OEPA DOE	1	Letter
R-014-207.3	1139	REMOVAL #5 - DECANT SUMP TANK U.S. DOE FERNALD OH6 890 008 976	01/10/1991	USEPA DOE	2	Letter
R-014-207.4	1989	CONDITIONAL APPROVAL K-65 DECANT SUMP REMOVAL WORK PLAN	01/11/1991	OEPA DOE	2	Letter

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R-014-207.6	3763	U.S. EPA COMMENTS ON REMOVAL ACTION 5: K-65 DECANT SUMP TANK FINAL REPORT	09/25/1992	USEPA DOE	1	Letter
R-014-207.7	3787	OHIO EPA COMMENTS ON THE OU 4 - DECANT SUMP TANK REMOVAL ACTION FINAL REPORT	10/01/1992	OEPA DOE	1	Letter
R-014-207.8	4024	APPROVAL OF THE OU4 DECANT SUMP TANK FINAL REPORT	12/14/1992	OEPA DOE-FN	1	Letter
R-014-207.9	4019	REMOVAL ACTION 5: K-65 DECANT SUMP TANK FINAL REPORT RESPONSE TO COMMENTS	12/29/1992	USEPA DOE-FN	1	Response
R-014-208.1	1140	WMCO TECHNICAL RECOMMENDATIONS FOR THE RESPONSE TO U.S. EPA MODIFICATIONS OF THE K-65 DECANT SUMP TANK REMOVAL ACTION WORK PLAN		WMCO DOE	7	Enclosure
R-014-208.2	DOE-867-91 1142	K-65 DECANT SUMP TANK REMOVAL ACTION	03/01/1991	DOE USEPA	2	Letter
R-014-208.3	903	RESPONSE TO THE U.S. EPA COMMENTS K-65 DECANT SUMP TANK REMOVAL ACTION WORK PLAN	12/11/1990	DOE USEPA	8	Response
R-014-208.4	904	RESPONSE TO OHIO EPA COMMENTS K-65 DECANT SUMP TANK REMOVAL ACTION WORK PLAN	12/11/1990	DOE OEPA	2	Response
R-014-208.5	1990	THE RESPONSE TO OHIO EPA GENERAL COMMENTS ON THE K-65 DECANT SUMP TANK REMOVAL ACTION WORK PLAN		DOE OEPA	2	Response
R-014-208.6	DOE-0343-93 3895	RESPONSES TO COMMENTS ON THE OPERABLE UNIT (OU) 4 DECANT SUMP TANK FINAL REPORT	11/19/1992	DOE EPAs	30	Response
R-014-209.1	3611	FINAL REPORT K-65 DECANT SUMP TANK REMOVAL ACTION AUGUST 1992	08/01/1992	DOE EPAs	40	Report

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R-014-401.1	1141	POTENTIAL ARARS K-65 DECANT SUMP TANK REMOVAL ACTION		DOE EPAs	5	Report
R-014-1002.1	5906	ADDENDUM B TO THE RI/FS COMMUNITY RELATIONS PLAN FOR REMOVAL ACTION NO. 5 K-65 DECANT SUMP TANK AUGUST 1991	08/01/1991	DOE-FN EPAs	5	ADDENDUM
R-014-1003.1	1766	THE USDOE ANNOUNCES THE AVAILABILITY FOR PUBLIC REVIEW OF THE ADMINISTRATIVE FILE FOR THE K-65 DECANT SUMP TANK REMOVAL ACTION AT THE DOE FEMP, FERNALD, OHIO		DOE PUBLIC	1	NOA

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R-025-104.1	DOE-65-91 5443	PERMIT TO OPERATE FOR FMPC SILO NO.3	10/19/1990	DOE-FMPC OEPA	8	LETTER
R-025-108.1	NEPA DOC. 369 4462	CATEGORICAL EXCLUSION DETERMINATION SILO 3 REMOVAL ACTION NEPA DOCUMENT 369	03/03/1992	DOE-FN DOE-HQ	5	Report
R-025-108.2	NEPA DOC 386 4481	CATEGORICAL EXCLUSION DETERMINATION SILO 3 BEST MANAGEMENT PRACTICES (BMP) WEATHERPROOFING NEPA DOC 386	07/02/1992	DOE-FN DOE-HQ	4	Report
R-025-201.1	DOE-105-91 2244	ACTION MEMORANDUM: SILO 3	10/03/1991	DOE WEMCO	2	Letter
R-025-201.2	DOE-515-91 2676	ACTION MEMORANDUM: SILO 3 REMOVAL ACTION	12/13/1991	DOE WEMCO	2	Letter
R-025-201.3	DOE-523-92 2538	SILO 3 REMOVAL ACTION	12/19/1991	DOE EPAs	2	Letter
R-025-202.1	2245	REMOVAL SITE EVALUATION SILO 3	09/01/1991	DOE WEMCO	50	RSE
R-025-204.1	WEMCO:P:91-957 2677	SILO 3 REMOVAL ACTION SCOPE OF WORK	12/17/1991	WEMCO DOE	4	Letter
R-025-204.2	WEMCO:P:92-008 2780	SILO 3 BEST MANAGEMENT PRACTICE WORK PLAN	01/06/1992	WEMCO DOE	16	Work Plan
R-025-206.1	DOE-016-92 2211	CHAIN-OF-CUSTODY FOR SILO 3 MATERIAL	10/04/1991	DOE USEPA	2	Letter
R-025-209.1	WEMCO:EVP:92-014 2682	SILO 3 REMOVAL ACTION	01/23/1992	WEMCO DOE	1	Letter
R-025-209.2	DOE-1215-93 4143	SILO 3 EXPEDITED REMOVAL ACTION FINAL REPORT	02/24/1993	DOE-FN EPAs	2	Letter

Index Number	Document Number	Document Title	Document Date	From To	# of Pages	Type of Documents
R-025-209.3	4144	FINAL REPORT SILO 3 REMOVAL ACTION SEPTEMBER 1993	02/01/1993	DOE-FN EPAs	40	Report
R-025-1003.1	WEMCO:EM(AR):91-087 2678	APPROVAL OF NOTICE OF AVAILABILITY (NOA) FOR THE SILO 3 EXPEDITED REMOVAL ACTION	01/09/1992	WEMCO DOE	1	Letter
R-025-1003.2	2679	THE USDOE ANNOUNCES THE AVAILABILITY FOR PUBLIC REVIEW OF THE ADMINISTRATIVE RECORD FILE FOR THE SILO 3 EXPEDITED REMOVAL ACTION AT THE DOE FMPC, FERNALD, OHIO		DOE PUBLIC	1	NOA

Index Number	Document Number	Title	Document Date	From / To	# of Pages	Document Type
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U-006-105 .	5975	FINAL DESIGN REPORT RADON MITIGATION & DOME REINFORCEMENT PROJECT	08/20/87	IT CORP. / DOE-FN	337	REPORT
U-006-105 .	5976	EVALUATION OF WMCO FOAM ALTERNATIVES	04/06/88	IT CORP. / DOE-FN	144	REPORT
U-006-105 .	5977	QUALITATIVE FEASIBILITY STUDY OF ALTERNATIVES FOR INTERIM REMEDIATION OF K-65 SILOS	06/17/88	TI CORP. / DOE-FN	27	REPORT
U-006-105 .	5978	QUANTITATIVE ANALYSIS REPORT OF ALTERNATIVES FOR INTERIM REMEDIATION OF K-65 SILOS	07/01/88		188	REPORT
U-006-105 .	5979	THE ADAPTABILITY OF VITRIFICATION TECHNOLOGY TO K-65 RESIDUE MATERIAL	05/25/89	PAC. NW LABS / DOE-FN	7	REPORT
U-006-302 .	5999	INDEX OF CHEMICAL DATA PACKAGES - OPERABLE UNIT 4 - AUGUST, 1994	08/31/94	FERMCO / FERMCO	24	DATA
U-006-302 .	6000	INDEX OF REFERENCED CHECMICAL ANALYTICAL DATA PACKAGES - OPERABLE UNIT 4 - AUGUST 1994	08/31/94	FERMCO / FERMCO	6	DATA
U-006-302 .	6001	INDEX OF RADIOLOGICAL ANALYTICAL DATA PACKAGES - OPERABLE UNIT 4 - AUGUST 1994	08/31/94	FERMCO / FERMCO	7	DATA
U-006-302 .	6002	INDEX OF REFERENCED RADIOLOGICAL ANALYTICAL DATA PACKAGES - OPERABLE UNIT 4 -AUGUST 1994	08/31/94	FERMCO / FERMCO	6	DATA
U-006-302 .	6003	INDEX OF FIELD FORMS - OPERABLE UNIT 4 - AUGUST 1994	08/31/94	FERMCO / FERMCO	9	DATA

Index Number	Document Number	Title	Document Date	From / To	# of Pages	Document Type
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U-006-303 .	5980	SITE SPECIFIC SAFETY PLAN FOR THE K-65 LOW-ANGLE BORING OPERATIONS MARCH 6, 1991	03/06/91	IT / DOE-FN	65	REPORT
U-006-305 .	5981	HAMILTON COUNTY COMMENTS - OU 4 PHASE II PILOT PLANT TRT STUDY WP	09/08/94	OEPA / DOE-FN	5	COMMENTS
U-006-408 .	DOE-2378,79,80-94 5982	TRANSMITTAL OF RESPONSIVENESS SUMMARY FOR THE OPERABLE UNIT 4 FEASIBILITY STUDY/PROPOSED PLAN-DRAFT ENVIRONMENTAL IMPACT STATEMENT SEPTEMBER 1994	09/09/94	DOE-FN / STAKEHOLDER	3	LETTER
U-006-408 .	5983	RESPONSIVENESS SUMMARY FOR THE OPERABLE UNIT 4 FEASIBILITY STUDY/PROPOSED PLAN - DRAFT ENVIRONMENTAL IMPACT STATEMENT - SEPTEMBER 1994	09/09/94	DOE-FN / EPA/STAKEHOLDER	352	RESPONSE
U-006-504 .	5984	OU4 RECORD OF DECISION - COMMENTS	09/12/94	OEPA / DOE-FN	4	COMMENTS
U-006-505 .	DOE-2389-94 5985	EXTENSION REQUEST FOR THE SUBMITTAL OF THE FINAL OPERABLE UNIT 4 FINAL RECORD OF DECISION	09/14/94	DOE-FN / USEPA	2	LETTER
U-006-505 .	DOE-0034-95 6056	TRANSMITTAL OF RESPONSES TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY AND THE OHIO ENVIRONMENTAL PROTECTION AGENCY COMMENTS ON THE CONDITIONALLY APPROVED DRAFT RECORD OF DECISION FOR OPERABLE UNIT 4	10/11/94	DOE-FN / EPAS	2	LETTER
U-006-505 .	6057	PROPOSED DRAFT RECORD OF DECISION FOR REMEDIAL ACTIONS AT OPERABLE UNIT 4 RESPONSE TO COMMENTS - OCTOBER 1994	10/11/94	DOE-FN / EPAS	15	RESPONSES
U-006-1003.	C:ENV:94-0047 5986	APPROVAL FOR NOTICE OF AVAILABILITY (NOA) OF THE RESPPONSIVENESS SUMMARY FOR THE OPERABLE UNIT 4 FEASIBILITY STUDY/PROPOSED PLAN-DRAFT ENVIRONMENTAL IMPACT STATEMENT	09/13/94	FERMCO / DOE-FN	3	LETTER
U-006-1003.	5987	THE UNITED STATES DEPARTMENT OF ENERGY ANNOUNCES THE AVAILABILITY FOR PUBLIC INSPECTION OF THE RESPONSIVENESS SUMMARY FOR THE OPERABLE UNIT 4 FEASIBILITY STUDY/PROPOSED PLAN-DRAFT ENVIRONMENTAL IMPACT STATEMENT	09/14/94	DOE-FN / PUBLIC	1	NOA

Index Number	Document Number	Title	Document Date	From To	# of Pages	Document Type
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U-006-1005.	5988	OVERHEADS PRESENTED AT THE MAY 11, CAB MEETING IN NEVADA - (CITIZEN'S ADVISORY BOARD)	05/11/94	DOE-FN CAB	48	OVERHEADS

APPENDIX E

STATE OF OHIO CONCURRENCE
TABLE D.3-5 (Continued)

Pathway Parameters	Trespassing Child Age 6-18	Expanded Trespasser Child Age 6-18	Expanded Trespasser Adult 18-50	RME On-Property Farmer Age 1-70	CT On-Property Resident Farmer Age 1-70	On-Property Resident Child Age 1-6	O
Inhalalion of Volatiles Released from Household Water Uses							
IR (m3/hr)	N/A	N/A	N/A	0.63	0.63	0.63	
ET (hr/d)	N/A	N/A	N/A	0.25h	0.17h	0.33h	0.25h
EF (d/yr)	N/A	N/A	N/A	350d	275b	350d	350d
ED (yr)	N/A	N/A	N/A	70	9e	6	70
BW (kg)	N/A	N/A	N/A	70	70	15	
AT-Noncancer (d)f	N/A	N/A	N/A	25550	3285	2190	
AT-Cancer (d)g	N/A	N/A	N/A	25550	25550	25550	
Incidental Ingestion of Soil/Sediment							
IR (g/hr)	0.1	0.1	0.1	0.18	0.122	0.2	
FI (unitless)	0.25	0.1	0.05	1	1	1	
EF (d/yr)	52	110	40	350d	275b	350d	
ED (yr)	12	12	32	70	9e	6	
BW (kg)	43	43	70	70	70	15	
AT-Noncancer (d)f	4380	4380	11680	25550	3285	2190	
AT-Cancer (d)g	25550	25550	25550	25550	25550	25550	

See footnotes at end of table.

Pathway Parameters	Trespassing Child Age 6-18	Expanded Trespasser Child Age 6-18	Expanded Trespasser Adult 18-50	RME On-Property Farmer Age 1-70	CT On-Property Resident Farmer Age 1-70	On-Property Resident Child Age 1-6	O
Dermal Contact While Bathing							
SA (m2)	N/A	N/A	N/A	2.3h	2.3h	0.8h	
PC (cm/hr)	N/A	N/A	N/A	csv	csv	csv	
ET (hr/d)	N/A	N/A	N/A	0.25h	0.17h	0.33h	
EF (d/yr)	N/A	N/A	N/A	350d	275b	350d	
ED (yr)	N/A	N/A	N/A	70	9e	6	
BW (kg)	N/A	N/A	N/A	70	70	15	
AT-Noncancer (d)f	N/A	N/A	N/A	25550	3285	2190	
AT-Cancer (d)g	N/A	N/A	N/A	25550	25550	25550	
Dermal Contact With Soil/Sediment							
SA (m2)	0.41	0.41	0.57	0.57	0.5	0.2	
DA (cm/m2)	1	1	1	csv	csv	csv	
ABS	csv	csv	csv	csv	csv	csv	
EF (d/yr)	52	110	40	350d	275b	350d	
ED (yr)	12	12	32	70	9e	6	
BW (kg)	43	43	70	70	70	15	
AT-Noncancer (d)f	4180	4180	11680	25550	3285	2190	
AT-Cancer (d)g	25550	25550	25550	25550	25550	25550	

See footnotes at end of table.

Pathway Parameters	Trespassing Child Age 6-18	Expanded Trespasser Child Age 6-18	Expanded Trespasser Adult 18-50	RME On-Property Farmer Age 1-70	CT On-Property Resident Farmer Age 1-70	On-Property Resident Child Age 1-6	O
Inhalation of Dusts, Volatiles, and Radon							
DR (mrem/hr)	csv	csv	csv	csv	csv	csv	
ET Indoors (hr/d)	N/A	N/A	N/A	18.3	19.8	22	
ET Outdoors (hr/d)	4	2	1	5.7	4.2	2	
EF (d/yr)	52	110	40	350	275	350	N/A
ED (yr)	12	12	32	70	9	6	
BW (kg)	43	43	70	70	70	15	
Ingestion of Vegetables and Fruit							
IR (g/d)	N/A	N/A	N/A	122	78b	101.5i	
FI (unitless)	N/A	N/A	N/A	1	1	1	
EF (d/yr)	N/A	N/A	N/A	350d	275b	350d	
ED (yr)	N/A	N/A	N/A	70	9e	6	
BW (kg)	N/A	N/A	N/A	70	70	15	
AT-Noncancer (d)f	N/A	N/A	N/A	25550	3285	2190	
AT-Cancer (d)g	N/A	N/A	N/A	25550	25550	25550	
Ingestion of Meat							
IR (g/d)	N/A	N/A	N/A	75	50b	29	
FI (unitless)	N/A	N/A	N/A	1	1	1	
EF (d/yr)	N/A	N/A	N/A	350d	275b	350d	
ED (yr)	N/A	N/A	N/A	70	9e	6	

Pathway Parameters	Trespassing Child Age 6-18	Expanded Trespasser Child Age 6-18	Expanded Trespasser Adult 18-50	RME On-Property Farmer Age 1-70	CT On-Property Resident Farmer Age 1-70	On-Property Resident Child Age 1-6	O
BW (kg)	N/A	N/A	N/A	70	70	15	
AT-Noncnacer (d)f	N/A	N/A	N/A	25550	3285	2190	
AT-Cancer (d)g	N/A	N/A	N/A	25550	25550	25550	
Ingestion of Milk							
IR (L/d)	N/A	N/A	N/A	0.3	0.2b	0.9	
FI (unitless)	N/A	N/A	N/A	1	1	1	1
EF (d/yr)	N/A	N/A	N/A	350d	275b	350d	
ED (yr)	N/A	N/A	N/A	70	9e	6	
BW (kg)	N/A	N/A	N/A	70	70	15	
AT-Noncancer(d)f	N/A	N/A	N/A	25550	3285	2190	
AT-Cancer(d)g	N/A	N/A	N/A	25550	25550	25550	

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a Parameter values obtained from Final RI Report for Operable Unit 4 (November 1993), Table D.3-12.
b Special guidance from EPA Region V.
c Drinking water consumption rate of 1.4 L/day from NRC (Nuclear Regulatory Commission), 1977, U.S. Nuclear Regulatory Commission) Regu (National Council on Radiation Protection) Report No. 76.
d Guidance from EPA (1991a), OSWER Directive: 9285.7-O1B.
e Guidance from EPA (1991b), Interim Final, OSWER Directive: 9285.6-03.
f Calculated as the product of ED (years) x 365 days/year.
g Averaging time for carcinogens calculated as the product of 70 years x 365 days/year.
h EPA (1992a), "Dermal Exposure Assessment: Principles and Applications, EPA/600/8-91/O11B.
i Guidance from EPA (1989), Interim Final, p. 6-36.

See footnotes at end of table.

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February 11, 1994

Mr. Jack R. Craig
Project Manager
U.S. DOE - FEMP
Post Office Box 398705
Cincinnati, Ohio 45239-8705

Dear Mr. Craig:

The purpose of this letter is to conditionally approve the revised O.U.4 FS/PP based on comment responses and conference calls that have occurred during the past several weeks. Conditional approval is given until we see the negotiated changes in the final document.

If you have any questions, please contact Tom Schneider or me.

Sincerely,

Graham E. Mitchell
Project Manager

GEM:nys

cc: Jenifer Kwasniewski, DERR
Tom Schneider, DERR
Mike Proffitt, DDAGW
Jim Saric, U.S. EPA
Ken Alkema, FERMCO
Lisa August, GeoTrans
Jean Michael, PRC
Robert Owen, ODH